EXPERIMENTAL ANALYSIS OF HUMAN BEHAVIOR BULLETIN 2000, **18**, 19 - 20

INVITED COMMENTARY, OBSERVATIONS AND REMARKS

PIAGET ON EQUIVALENCE

Romariz da Silva Barros and Olavo de Faria Galvão

UNIVERSIDADE FEDERAL DO PARÁ, BELÉM, BRASIL

Piaget and Szeminska (1941/1975), in "Genesis of number in the child," reported a series of experiments on the equivalence between continuous and discrete quantities. The objective of the study was to go further than "the analysis of the sensory-motor sources of development" and "verbal and conceptual aspects of children's thought," and to reach what they called "net of operations that creates the notion of number" (p.11).

In Chapter 11, discussing the "coordination of equivalence relations and the multiplicative composition of numbers," they state that equivalence relations are "general mechanisms involving logic and founded on biunivocal and reciprocal correspondence relations," for example, symmetric relations (p. 279).

Actually, they were analyzing the equivalence of the quantities of elements between sets. It is interesting to take a look back at their procedures. In some tests, 4- to 6-year-old children were individually presented with ten jars (Class A) and ten blue flowers (Class B). Each child was asked to put the ten flowers in the ten jars, one in each (AB training), and pull them out; then the experimenter asked if there were as many flowers as jars.

According to Piaget and Szeminska, the one-to-one correspondence between Classes A and B builds the equivalence between Classes A and B. Then the blue flowers were taken away and ten pink flowers (Class C) were presented, and the procedure was repeated (AC training). Finally, a test was presented in the form of a verbal question: "Is there the same quantity of blue as of pink flowers?" (BC relation). Some of the children answered yes, and so demonstrated the equivalence of the quantities of elements between Classes B and C "that had never been put one in sight of the other" (p.281).

In short, Piaget & Szeminska's reasoning was that the "composition" of the equivalence relations remained in relations A_B and A_C, and thus in B_C as well, where the symbol "__" "represents the equivalence due to the biunivocal and reciprocal - therefore - symmetric relation" (p. 280).

A similar test was also presented to other children. Each child was given ten egg-holders (Class A), where she or he placed ten eggs (Class B), establishing a one-to-one correspondence between sets (AB relation). The eggs were taken out, set aside, and another ten eggs were treated in the same manner. Then the child was asked if there were as many eggs here (pointing to one set of eggs) as there (pointing to the other set of eggs). Again, Piaget and Szeminska reasoned that a demonstration of the relation between Classes B and C showed the "composition" of the equivalence relations.

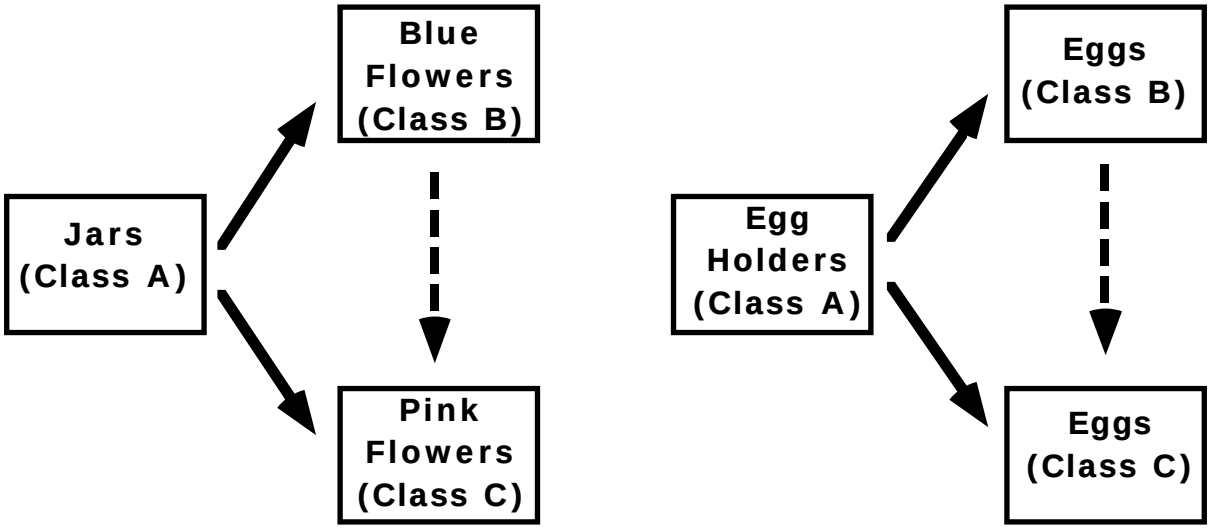

Figure 1

Figure 1 shows the trained (solid arrows) and "composed" (dashed arrows) relations in Piaget & Szeminska's studies, diagrammed according to Sidman (1992). What Piaget and Szeminska referred to as "composition" is currently denominated "emergence." Indeed, Sidman (1992) indicates that the emergence of BC and CB untrained relations after AB and AC training indicates that the trained conditional relations were equivalence relations.

REFERENCES

Piaget, J. & Szeminska, A. (1941). *La genèse du nombre chez l'enfant*. Neuchâtel: Delachaux et Niestlé.

Piaget, J. & Szeminska, A. (1975). *A gênese do número na criança* [Genesis of number in the child]. C. Oiticica, Portuguese translation from 3rd French Edition (1964). Rio de Janeiro: Zahar Editores. (Original work published 1941)

Sidman, M. (1992). Equivalence relations: Some basic considerations. In S. C. Hayes & L. J. Hayes (Eds.), *Understanding verbal relations* (pp. 15-27). Reno NV: Context Press.