Cognitive Flexibility
A Cross-Cultural Study of

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Abstract

Flexible cognition develops from 3-5 years. Most evidence comes from rule-switching tests, but these tests use different skills than new tests of flexible language comprehension. Development of rule-flexibility and meaning-flexibility might rest on different cultural experiences. 3- to 5-year-old American (NA) and African (SA) children were tested in English or Tswana. NA children were more rule-flexible than SA children (3DCCS test). However, groups were similar in meaning-flexibility (FIM-An test). It seems different culture-specific and -general flexibility skills affect language and cognition.

Background

Flexible cognition = changing attention, representations, and responses to fit new demands (task cues; stimulus pattern).
Flexible cognition develops from 3 - 5 years: a general change in executive cognition, or distinct kinds of flexibility? If some flexibility is culture-specific, it would imply distinct kinds.
TWO KINDS OF FLEXIBILITY IN CHILD LANGUAGE?
Flexible Induction of Meaning: In the FIM test (Deák, 2000) children must use several linguistic cues (ex: phrase “lives in a...”) to infer new word meanings. Prediction: culture-general.
Flexible Rule-Switching: In the DCCS (Zelazo et al., 1996) children must follow changing rules to sort cards in different ways. Rules & switches are arbitrary, so the test uses predicate logic & odd pragmatics. Prediction: culture-specific.

Specific Questions

• Do meaning-inducing and rule-using flexibility develop in the same way from 3 to 5 years? Are the same kids flexible or inflexible in both kinds of tasks?
• Does the same developmental change happen in non-Western cultural groups? Do poor, African, Tsana-speaking kids develop like affluent, U.S., English-speaking kids?
• Does sub-task order in each test (Deák, 2003) have the same effect on English- and Tsana-speaking children?

Method

Participants:
– 120 3-, 4- and 5-year-olds
• 60 American English-speaking children
• 60 South African Tsana-speaking children
Tests of Flexible Cognition:
– Inducing Meaning: FIM-Animates (Deák, 2003) [Figure 1]
• Sets of pictures of novel creatures. Each set has:
  – Standard, same-species, same-possession, same-habitat, foil
• 3 words per creature. Each follows a different phrase cue that implies a different property:
  – “is a...” implies species
  – “holds a...” implies possession
  – “lives [in/on] a...” implies habitat
– Rule-Switching: 3DCCS (Deák, 2003) [Figure 2]
• Picture cards vary in shape (animal), color, and size
• Sort into one of four boxes, based on three rules:
  – “Shape game”;
  – “Color game”;
  – “Size game”

Figure 1

Figure 2

Cards to be sorted

Target:

Birds here / fish here / dogs here
Color Game: blue here / red here / yellow here
Shape Game: middle here / little here / big here
Design

- FIM-An then 3DCCS; 1 of 2 randomly-assigned groups:
  - Hard: both tasks start with easiest cue/rule subtask
  - FIM-An: “is a”/species first; 3DCCS: shape first
  - Easy: both start with hardest cue/rule subtask
  - FIM-An: “lives in a”/habitat first; 3DCCS: size first

Results: FIM Animates [Figure 3]

- Correct switches: Age: F(2, 112) = 10.3, p < .001

Results: 3-DCCS [Figure 4]

- Correct switches: Age: F(2, 112) = 6.1, p < .003
- Country: F(1, 112) = 11.5, p < .001
- A x C: F(2, 112) = 5.9, p < .004

Results: Hard vs. Easy Order [Figure 5]

- 3DCCS: No effects or interactions
- FIM-An: Culture-dependent
  - “lives in a” 1st easier than “is a”: F(1,115) = 7.7, p = .007

Conclusions

- Children’s flexible thinking improves from 3 to 5 years of age.
  - Two tasks: Inferring meaning; Switching rules
  - Implications for school readiness; language learning
  - Interaction of task and culture:
    - Similar development of word-learning flexibility (FIM-An) between cultures
    - Phrases cues were not equally difficult in English & Tswana: US children focus on species (“is a” cue); SA children were more responsive to “lives in a” cue.
    - Different patterns in flexible rule-based flexibility (3DCCS)
  - South African children: not flexible by age 5 years.
  - U.S. children: significant increases in flexibility between 3 and 5 years, despite complexity of task
  - May reflect social experience, familiarity with materials, or language differences

References