

# snippets

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Gelman and Gallistel (1978) formulate three principles that characterise counting:

1. The stable order principle: There must be a stably ordered list of counting symbols;
2. The 1-1 correspondence principle: In counting, the symbols must be applied in 1-1 correspondence to the individuals in the set being enumerated;
3. The cardinality principle: The cardinal value of the set is determined by the ordinal position of the last symbol reached in the count.

It has been noticed that in the course of acquisition of counting, there is a stage (6-18 months) when the first two principles are observed, but the last one isn't. Wynn (1990) identified children who could count at least to six, observing principles 1 and 2, but who failed when asked to give 'two' or 'three' objects.

Carey (2009) capitalizes on this finding and develops a 'Quinean bootstrapping' theory of number acquisition, which has a crucial linguistic component. Carey breaks the number acquisition into three steps:

- A. Learning the ordered list ("one, two, three, four, five, six,...");
- B. Learning the meaning of each symbol in the list ('five' means five);
- C. Learning how the list represents number.

As the first step, the child learns the count list as a list of meaningless words, very much like "eeny, meeny, miny, mo". The meaning of the count list members boils down to their relative order in the list. As the next step, Quinean bootstrapping, this set of uninterpreted symbols gradually acquires meaning. Setting aside the details of this process, the count list is a linguistic prerequisite for number acquisition. During the course of number acquisition, the members of the count list, practically, get the meaning of cardinal numerals.

Given Carey's bootstrapping theory, it is unexpected that some languages have different words for numbers in the count list and for cardinal numerals. One example is Russian, where the count list and the list of cardinals differs in the first element: 'raz', 'dva', 'tri'... (count list) vs. 'odin', 'dva', 'tri'... (cardinal list). The special count form of 'one' in Russian cannot be used in cardinal constructions or in mathematical contexts:

- |                 |     |              |
|-----------------|-----|--------------|
| (1) '*raz stol' | vs. | 'odin stol'  |
| 1.COUNT table   |     | 1.CARD table |

(2) [How many tables do you have in your apartment?]

— Odin. / \*Raz.

(3) Des'at' pl'us odin / \*raz budet odinnadtsat'.

10 plus 1.CARD / 1.COUNT will.be 11.

'10 plus 1 makes 11'

Hurford (1998: 4-7) lists more languages that have the same property: the words used when reciting the counting sequence are different from cardinal numerals in Chinese, Maltese, Godoberi, Archi, German, Hungarian and Basque (the latter three are less clear cases). This phenomenon is not restricted to number 1.

The differences between count lists and cardinal numerals do not immediately undermine Carey's bootstrapping hypothesis, but the hypothesis seems to predict that there should be a stage in numeral acquisition when children use the members of the count list as cardinals. To the best of my knowledge, this prediction has never been tested.

### References

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