# KIDS COUNT!

## First Steps in Counting

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Republic of Mathematics

Chapter 2

# How Children Count

## 2.1 Introduction

What do children do when they count? What sort of actions do they carry out? What do they think about when they are counting?

In this book - Kids Count: First Steps in Counting - we base our answers to these questions mainly on the pioneering work of Leslie P. Steffe (pronounced "Steffy"), at the University of Georgia, and his former student Robert Wright, at Southern Cross University in Australia.

Steffe has made a deep study of the types of children's counting behavior. His research is based on ideas of the Swiss psychologist Jean Piaget (pronounced "Zhohn Pea-AH-zhay"; see figure 2.2, below). Steffe has worked with numerous colleagues in his quest to unravel children's mathematical thinking and development.

Leslie P. Steffe

Robert J. Wright

Figure 2.1: Les Steffe and Bob Wright

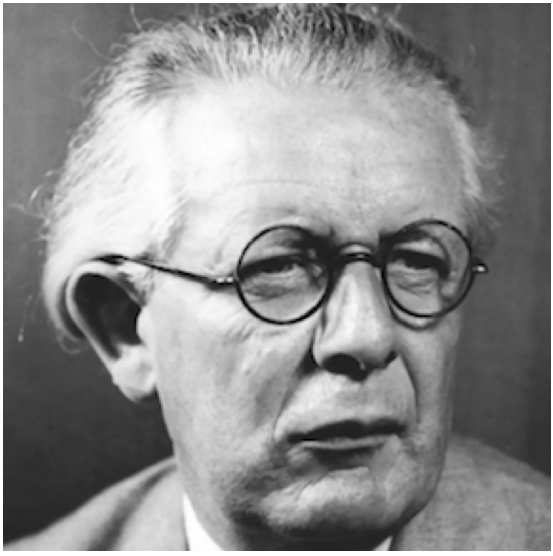

Figure 2.2: Jean Piaget

As a result of this work we can now distinguish a number of different counting types - different ways in which children count.

Robert Wright and colleagues, working out of Southern Cross University in northern New South Wales, Australia, have devel-

oped, and applied, these counting types in classrooms in the United States, Australia and England. Steffe and his co-workers developed the basis for the counting types through keen observation of children. They used Jean Piaget's fundamental ideas of children's mental development to help them see the counting types clearly.

The counting types have proved to be remarkably stable. The counting types predict children's counting development in a wide variety of settings, and in every country in which they have been tested.

The counting types will be explained below. We will describe typical behavior of children in each of the counting types.

We will show you how to find out what type of counter your child is right now.

We give you ideas on how to help your child strengthen their counting strategies.

Then we give you some important ideas on how you can help your child progress to more efficient and productive counting strategies.

## 2.2 Overview of counting types

The counting types develop by Leslie Steffe and co-workers describe behaviors of children as they develop deeper understanding of counting and of numbers.

In this book we look at the counting types up to "counting-on", in which a child can count on from a given number, such as "7, 8, 9, 10" to figure that 3 more than 7 is 10.

The reason that counting-on is so important is that it signals a major step in a child's counting development. The ability to count-on and to use counting-on in different settings is what points to a child beginning to develop a strong and flexible sense of numbers.

### 2.2.1 One-to-one correspondence

Learning to count effectively is not simple for very young children. To be successful with counting they need to co-ordinate several actions. For example, to count a group of objects children need to know the following:

1. The number names, in correct order, up to the number of objects in the group.
2. That the last number they say is the actual number of the objects in the group.
3. That they can start counting from any object in the group.
4. That the objects in the group need not be identical.
5. That they count each object in the group once and only once.

We refer to an ability to count each object in a group once and only once as being able to make a one-to-one correspondence. This means that a child can co-ordinate each number name with precisely one object in the group of things they are counting.

### 2.2.2 Emergent counting

Children three, four, and even five, years old will sometimes not yet be able to say the number names in correct order. Often they will have difficulty matching number names with objects.

We call these children *emergent counters*.

An emergent counting will show beginning signs of being able to count - to match number names with objects, using one-to-one correspondence. But they will not be consistent in their counting. An emergent counter might successfully count 5 objects today, yet tomorrow they might not be able to count 4 objects correctly.


We use the term "emergent counter" in this book as an abbreviation for "a child who uses emergent counting".

It is important to keep in mind that the term "emergent counter" is not a characteristic description of a child, and should not be used as a label for a child.

It is simply an assessment of a child's predominant counting actions and abilities at a particular time in their life.

A child who uses emergent counting strategies will, sometime soon, develop into physical counting, then figurative counting, and counting-on.

Their counting *development* is key, as is recognizing where they are in that development.

### 2.2.3 Physical counting

Children who use physical counting can do things that those who use emergent counting cannot.

They can count small numbers of physical objects around the house.

A child who uses physical counting may be able to consistently count up to 5 objects but may not, yet, be able to count 25 objects.

What is important is whether they can consistently count up to a certain number of objects - 5 for example.

A physical counter will show consistency in their counting. Typically there will be counting tasks, such as counting as much as 45 objects, that are simply too hard, yet, for a beginning physical counter.

### 2.2.4 Figurative counting

There are things that a physical counter cannot do. A physical counter cannot count hidden objects.

For example, if there are 3 cookies on the table in plain view, and 2 more in the pantry, out of sight, a physical counter cannot figure out how many there are in total.

A child who can consistently work out how many objects there are in total when some of those objects are hidden from sight is called a figurative counter.

Figurative counters will always count from 1 when they need to find the total number of objects, such as 5 cookies and 3 more that are hidden from sight.

### 2.2.5 Counting-on

When a child finds the total of 5 cookies and 3 more by counting “six, seven, eight” they are counting-on.

The counting-on strategy signals a major re-organization of a child's thinking about counting.

Children who use counting-on are able to recall that a number word like "five" is not only the number after four in the number word sequence - it is also a signal for memories of having counted "one, two, three, four, five".

So, for children who can count-on, the number words have a double meaning - both as a word in the number word sequence and, importantly, as a trigger for recall of previous acts of counting.

It is those explicit memories that allow them to begin counting from six, for example. A figurative counter, by contrast, would have to begin counting again at one.

### 2.2.6 Counting by units

Children develop a great flexibility in their counting strategies when they can count unit bundles. Often this begins by counting in 2's: "2,4,6,8, ..." and then in 5's: "5, 10, 15, 20, ..."

Counting unit bundles relies on a child seeing a collection of things - for example two apples - as a unit bundle, as a single thing to be counted, and not as two separate apples to be counted individually.

Initially, children will count unit bundles physically, often tapping them as they count, just as they would with individual items. Then they progress to being able to count hidden unit bundles, and then to counting-on with unit bundles.