EARLY YEARS FOCUS: 10 SUBITISING ACTIVITIES

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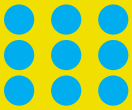
DEVELOPING EARLY NUMBER SENSE

Being able to rote count and count a collection of objects are important aspects of developing early number sense. Rote counting involves understanding that the numbers appear in a stable order, whereas counting a collection of objects involves counting with one-to-one correspondence (i.e., counting each object in a collection once to determine how many objects there are in total). Collectively, counting ideas might be described as understanding numbers as a verbal and visual sequence (Reys et al., 2011).

However, parallel to learning about the counting sequence, it is also important that children have experiences that allow them to build a structural understanding of number (Gervasoni, 2015). This begins with subitising. Subitising refers to the idea of knowing how many objects there are in a collection without counting (Clements, 1999). Perceptual subitising is generally limited to 4 or fewer objects, and is biologically innate (e.g., babies can do it). Conceptual subitising builds on perceptual subitising, and is driven by experience and exposure to patterns. For example, most five-year olds with some understanding of number language will immediately recognise this image as representing three (perceptual subitising):

However, many early school age children, through exposure to dice games, will recognise this image as representing six (conceptual subitising):

Further exposure to such patterns will lead to the recognition that this image represents nine:



Conceptual subitising lays the foundation for additive reasoning (joining, separating, comparing directly, part-part whole) and multiplicative reasoning (when children can flexibly reorganize how they see numbers depending on context – for example, 9 is three times greater than 3, and 3 is one-third of 9; but 9 is also 6 greater than three, and 3 is 6 less than 9).

Building on the Plate Games presented in a previous version of *Prime Number* (Russo, 2017), this article introduces ten simple subitising-related activities that can be undertaken with a set of subitising plates. The activities are suitable for one-on-one educator-student (or parent-child) interactions, teacher-facilitated small group work, or as a whole-of-class number fluency warm-up.

SUBITISING PLATES

One way of encouraging the development of subitising is to create a set of paper plates with different dot combinations as a classroom resource. I would suggest creating a set of 50 paper plates, with each number between 1 and 10 being represented in multiple ways. For example, the number 6 might be represented as two groups of 3 (i.e., the dice image), as three groups of 2, as 4 and 2 more, as 5 and 1 more, or as a semi-circle (see Figure 1).

Figure 1. Some different ways of representing the number 6.

Below are ten different activities you can undertake with the subitising plates. The goal of each activity is to build a structural understanding of number, and help to strengthen children's mathematical reasoning. However, for any of the activities, counting all can be viewed as an appropriate back-up strategy if children are not able to subitise to answer one of the corresponding questions.

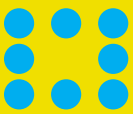
ACTIVITY 1: SUBITISING

Select a mixture of 20 to 30 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show one plate to children. Ask:

- How many dots do you see?
- How did you know?

Get children to count the dots if they are unsure. The advantage of undertaking the activity in small groups, or as a class, is that students are likely to use a variety of strategies for working out the total. This provides opportunities both to build mathematical reasoning (as students explain their particular strategy) and for students to be exposed to mentally partitioning and manipulating the dots in more than one way, enhancing their flexibility with number. For example, some students might argue that the following image represents 8 because it equates to 9 – 1; whilst other students may instead initially view it as 6 + 2, or perhaps 3 + 3 + 2, or even as 5 + 3.



ACTIVITY 2: SUBITISING (CONCEAL AND REVEAL)

Select a mixture of 10 to 20 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show one plate to children while covering one of the dots with your fingers.

Ask:

- How many dots do you see?
- How did you know?

Now reveal the extra dot. Ask:

- How many dots do you see now?
- How did you know?

This is a good activity for introducing a new number to be subitised (e.g., moving from 9 dot patterns to 10 dots patterns – see Figure 2).

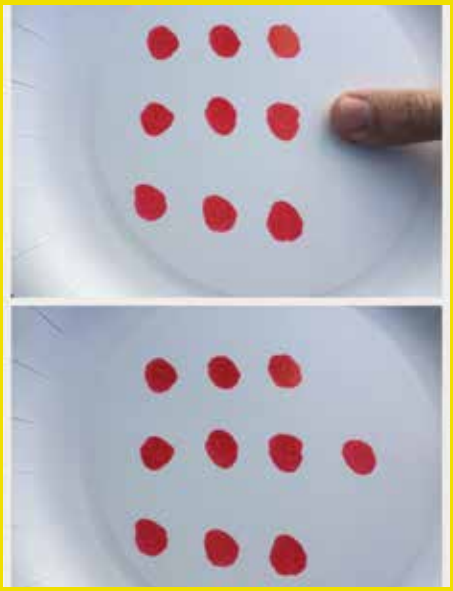


Figure 2. Using conceal and reveal to connect a 9-dot pattern to a 10-dot pattern.

ACTIVITY 3: SAME OR DIFFERENT

Select a mixture of 20 to 30 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show two plates to children. Ask:

- Are there the same or different numbers of dots on each plate?
- How did you know?
- Can you show me why both plates have the same (different) numbers of dots without counting?

An extension of this activity is to show three (or more) plates to children (two plates with the same number of dots but in a different pattern) and ask:

- Which of these plates have the same number of dots on them?
- How did you know?

ACTIVITY 4: MORE OR LESS

Select a mixture of 20 to 30 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show two plates to children. Ask:

- Which plate has more dots? Which plate has less dots?
- How did you know?
- Can you show me why this plate has more (less) dots without counting?

For example, a child might reason that a 5-dot plate has more dots than a 4-dot plate because 'they both have 4 (gesturing towards the 4-dot pattern as it appears on a dice), but this plate has 1 more' (see Figure 3).

Figure 3. A child explains why one plate has more dots than another.

ACTIVITY 5: SUBITISING BEFORE AND AFTER

Select a mixture of 10 to 20 paper plates based on the current mathematical knowledge/ability of the children you are working with.

- Show one plate to children. Get children to subitise the number and then say what number comes next in the counting sequence. For example: 'That's six dots. And seven comes after six'.
- Show one plate to children. Get children to subitise the number and then say what number comes before in the counting sequence. For example: 'That's six dots. And five comes before six'.

ACTIVITY 6: WHAT IS THE DIFFERENCE?

Select a mixture of 20 to 30 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show two plates to children. Ask:

- Which plates has more dots? Which plate has less dots?
- How did you know?
- Can you show me how many more dots are on this plate (gesturing towards plate with more dots) without counting?

ACTIVITY 7: HOW MANY ALTOGETHER?

Select a mixture of 20 to 30 paper plates based on the current mathematical knowledge/ability of the children you are working with.

1. Select a plate with one, two or three dots on it. Show the plate to children. Ask:

- How many dots on this plate?

2. Now show a plate with a larger number of dots on it. Ask:

- How many dots on this plate?

3. Now ask:

- How many dots altogether?
- How did you know?

Repeat steps 2 and 3; that is, make sure the same small number is reused so children get used to counting on 1, 2 or 3.

EARLY YEARS FOCUS: 10 SUBITISING ACTIVITIES (CONT.)

As well as strengthening their structural understanding of number, this activity is also designed to shift children from counting all to counting on.

ACTIVITY 8: TWO PLATES THAT MAKE 10.

Select a mixture of 20 to 30 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show three plates to children. Ask:

- How many dots do you see? (on each plate)
- Which two plates add together to equal 10? (make sure that two of the three plates add together to equal 10).
- How did you know?

This activity is designed to encourage the development of rainbow fact knowledge (also called friends of 10 or number bonds equaling 10).

ACTIVITY 9: HOW MANY MORE TO 10?

Select a mixture of 10 to 20 paper plates based on the current mathematical knowledge/ability of the children you are working with.

Show one plate to children. Ask:

- How many dots do you see?
- How many more dots would you need to make 10?
- How did you know?

This activity is designed to encourage the development of the count-up strategy and knowledge of rainbow facts.

ACTIVITY 10: 10 AND SOME MORE

Select a mixture of 10 to 20 paper plates based on the current mathematical knowledge/ability of the children you are working with.

1. Select a plate with ten dots on it. Show the plate to children. Ask:

- How many dots on this plate?

2. Now show a plate with a smaller number of dots on it. Ask:

- How many dots on this plate?

3. Now ask:

- How many dots altogether?
- How did you know?

The activity is designed to encourage children to view teen numbers as consisting of '10 and some more', laying the foundation for a preliminary understanding of place value. Initially children will be inclined to count - encourage them to count-on from 10. However, after additional exposure to this activity, they should move towards directly recognising teen numbers (e.g., when they see 10 and 4 more, they can recognise this as 14).

CONCLUDING THOUGHTS

In conjunction with The Plate Games (see Russo, 2017), these activities are intended to strengthen children's conceptual subitising capacity, build overall number sense and develop a structural understanding of number to support additive and (eventually) multiplicative thinking. If you are an Early Years teacher with engaging classroom ideas to support the development of conceptual subitising (or other early number concepts), we would love to hear from you. The editorial team and I would be delighted to support you to develop your ideas into an article you could share with other *Prime Number* readers! I encourage you to email me at: james.russo@monash.edu.

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