

# Creating Science – Communicating Science and the Magician’s Steal

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*Look and little closer, and think a little harder – learn to share the science you have created!*

*#CreatingScienceMagiciansSteal*

## Suggested Outcomes

(NOTE: This is by no means an exhaustive list of possible outcomes, neither is it intended that ONLY these outcomes can or should be met. Science is a deeply interrelated activity, and you may find cross curriculum links you can and should use.)

### Science inquiry skills

- Communicating 3: Represent and communicate observations, ideas and findings using formal and informal representations (AC SIS060)

### Science as a human endeavour

- Use and influence of science 3: Science knowledge helps people to understand the effect of their actions

### Science outcomes

- Chemical sciences 4: Natural and processed materials have a range of physical properties that can influence their use (AC SSU074)
- Physical sciences 4: Forces can be exerted by one object on another through direct contact or from a distance (AC SSU076)

### Cross curricular outcomes

- Performing arts and public presentations – magic tricks are a fun, and effective, way to share great ideas with other folks.(numbers)

### Science vocabulary words

Tier 2 (Dual meaning)

- Magic – common use, as something inexplicable and mysterious. In this science context, I would like to use it as something we don’t understand YET, but we CAN.

Tier 3 (Specialised vocabulary)

- Observation: what we sense, such as seeing a ball disappear, or noting a 100ml glass with 50ml of water.

- Perception: how we organise our senses to make sense, such as deciding the ball is in the closed hand, or that the 'glass is half full'.<sup>1</sup>
- Inference: giving reasons and explanations to what we sense or perceive, such as deciding the person is either magical or lying, or that someone has been drinking from our glass. To infer requires a theory, often several.

## Warning

- Sponge balls cause choking hazards. DO NOT put anything in your mouth for this activity, as with most science activities, and make sure you exclude students who might not be able to refrain from mouthing sponge balls, such as toddlers.

## Preparation

- Acquire the sponge balls from our Creating Science kit, or online. Alternatively you may use rolled up tissue paper, but we find a torn up foam mattress works particularly well and can be used to make cube shaped objects that are easier to manipulate.

## Suggestions for other year levels

As always, more material is presented here than can be used by the average class during the average lesson time. However, since the students' questions can and should guide student learning, more material is presented for your convenience. Remember, it is not uncommon for students to only remember those points which answered their personal questions.

### Younger:

This activity is a little challenging for this group. You may want to adapt it to the early childhood version in the appendix.

Children at this age can have difficulty with focus. Avoid tangents if you're attempting to make a key point.

### Middle:

This activity is well suited to this group, and leads very naturally into exploring and inventing other kinds of magic tricks for a rainy day.

### Teen:

Explore the work of some of the great magicians in the past. What tricks were they able to pull off with seemingly magical powers? What great magical tricks have never been explained?

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<sup>1</sup> Another example of the difference between observation and perception is that the eye has a blind spot, which we can observe under specific conditions, but do not normally perceive.

# Learning Intent (student friendly)

'We are learning to' (WALT) – communicate science.

## Success criteria

'What I'm looking for' (WILF) – students who can perform the Magician's Steal, and even more importantly, explain it in scientific terms.

## Student learning goals

Help students make a self-monitored learning goal for this lesson.

## Evidence of learning

How will you know when the learning goal is achieved? What EVIDENCE do you have that your students have met or exceeded the learning expectations?

- A successful Magician's Steal.
- A poster, speech or other description of the science behind the trick.
- Further deconstruction of magic tricks.

## Engage

- ⇒ Note the Learning Intention of this lesson for students.
- ⇒ Make sure all students write down any questions they may have generated during this phase regarding the topic for today.

Inform students of something along the lines of the following: "Life can be very tricky at times. I'm very tricky, do you think I can trick you all?" Or "As you all know, magic is just a trick. But they still work, because each magic trick has a little science inside. Do you think you can figure out my magic trick, and the science that makes it seem real?"

Perform the Magician's Steal – see appendix. You will NEED to practice and practice this several times first. With experience, you will get to the point where you cannot even see yourself steal the ball while looking carefully in a mirror.

Once you have the ball in one hand while everyone thinks the ball is in your other hand, you can 'magically' teleport the ball all over the place, behind someone's ear, for example.

## Explore

Ask students: Do you think I magically teleported the ball through the air? How do you think I *really* did this trick?

- ⇒ Encourage and validate student explanations of this phenomenon. You may like to ask students to write or draw their explanation personally to avoid embarrassment to students unfamiliar with this material. Remember, 'I don't know' is a valid explanation in science – it is the beginning of learning new things!

## Explain

Allow students to figure out how the trick is done. There's a good reason magicians rarely let their audience look at them from side on, and this trick is one of them. Do it slowly from side on and students are quite likely to figure it out.

Ask them to prove it by DOING IT THEMSELVES.

## But what's the science?

This magic trick makes use of several simple science tricks.

### Misdirection

Pointing to the empty hand, closed in a fist, gives people the strong impression that the ball is in that hand. Misdirection, some argue, is simply a kind of lie.<sup>2</sup>

### Observation and Inference

Your audience never actually sees the ball go into your hand (Observation), but they assume it did due to your behaviour (Inference).

## Elaborate

- ⇒ Ask students if they can design new ways to test this explanation, is it really sufficient? Can they think of further or better explanations, and the experiments needed to test them?

## Observation and Inference

What other examples can students think of where what they see, and how they make sense of what they see, are very different things?

We have to make sense of the world ALL THE TIME.

It can be very useful to learn to tell the difference between perceiving something, and what that something might actually mean.

- Lights and noise from another room might mean they are watching a movie, or that the room is on fire.
- A child lying down in the middle of the classroom might have fainted, or might be simply mucking around.
- A mutual friend tells you your best friend said they don't like you anymore. Perhaps they are lying?
- The sky is dark at midday. Is it a regular, predictable eclipse, or is the sky falling down?
- A horde of bees take up residence on your bicycle during school. Are they looking for somewhere to live, or are you the 'Chosen Bee Overlord'??

We need to make sense of our senses all the time!

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<sup>2</sup> Only say this last sentence if you're willing to field a deep philosophical discussion on the place of lying in our culture. Does it make it OK to lie if it's 'harmless and fun' - for example, Santa Claus?

## Communicate

Help students to share the Magician's Steal with others, and to explain the science of misdirection within. If you wish, have a discussion on observation and inference. Use the following techniques:

- Show others. Scientists often put on demonstrations of how their science works, or how to work their experiments. Billions of dollars every year are spent on building and demonstrating the latest science experiments for others to learn.
- Tell others. Scientists will often talk to each other, and ask each other their questions. Many science groups have what's called a 'conference' at least once a year where interested people from all over the world can attend and talk about their favourite science.
- Write it down. Scientists often write down what they've learnt so that other people can learn from it too. They are careful to be precise so that other scientists know how to do their experiments, and how they reached their conclusions. Writing can be very useful because it makes people take turns, and gives them time to think about other scientists' ideas - especially if they don't like them!

You can use any and all of these techniques to share the science of the Magician's Steal!

## Evaluate

- ⇒ Review with students what they felt they learnt from this lesson. Did they have any questions at the start that they feel were answered?

## Success criteria

- ⇒ Review the Learning Intentions of this lesson with students. Was it met?

At the end of each class, review the learning objective and see how we did. Ask:

- Did you achieve your learning goal?
- What did You learn?
- What worked to help you achieve it?
- What might you do better next time?
- (If needed) where can you go for extra help or information?

## Assessment

### Prior learning:

Take time to focus on planned content material during the engage phase, for example,

- How do scientists communicate their ideas? (The same way everyone else does, with drawings, writing, and showing others.)
- Is magic 'real'?

## Formative:

As students are learning, help them self-monitor their own learning and achievements. The Steal can be quite difficult to master, and will take some time. Help students to form groups to assist each other in learning.

## Summative:

Help students consider ways they can communicate their new understanding to others, just as scientists need to do. Using the communication ideas above, students can:

- Demonstrate the Magician's Steal, including misdirection and performance skills.
- Give an oral presentation of how it works.
- Prepare a slideshow or document with images for others.

## So what?

Even scientists need to learn how to communicate.

You can learn to see through magic tricks, and learn to see the magic of everyday life.

## Creating science

### Science inquiry skills

- Communicating 3: Represent and communicate observations, ideas and findings using formal and informal representations (ACISIS060) – as students communicate how to do the Magician's Steal to others, and explain the science behind it (such as perception and misdirection).

### Science as a human endeavour

- Use and influence of science 3: Science knowledge helps people to understand the effect of their actions – As we use science to see behind the magic and learn how impossible things are *really* done.

### Science understanding

- Chemical sciences 4: Natural and processed materials have a range of physical properties that can influence their use

## Appendix: The Magician's Steal

Print or otherwise display the following posters at the right moment for your teaching.


**1**



***Place the ball  
in your palm,  
and hold it there  
with one finger***

*(c) Dr Joseph Ireland 2014. [www.DrJoe.id.au](http://www.DrJoe.id.au)*

**2**



***Cover the ball  
with your fingers  
so that the audience  
cannot see it.***

*(c) Dr Joseph Ireland 2014. [www.DrJoe.id.au](http://www.DrJoe.id.au)*



**3**



*Quickly scoop the  
ball into your other  
hand,*

*(c) Dr Joseph Ireland 2014. [www.DrJoe.id.au](http://www.DrJoe.id.au)*

**4**



***point at your empty  
hand using the hand  
that is hiding the ball***

*(c) Dr Joseph Ireland 2014. [www.DrJoe.id.au](http://www.DrJoe.id.au)*

**5**



*Point at your  
empty hand as  
you move it away*

*(c) Dr Joseph Ireland 2014. [www.DrJoe.id.au](http://www.DrJoe.id.au)*

## Appendix: Early Childhood Version.

Some students will not be able to manage the manual dexterity to perform the Magician's Steal in this manner. In this case you might like to use the adaption shown to me by a boy in year 1.

1. Place the ball in your hand.
2. Place hands together, palms facing, in front of your audience. Hide the ball inside.
3. Quickly as you can, snatch the ball into one hand, or the other. Have the audience try to guess which hand the ball is in.

It's a simple, fun, game oriented activity that kids love.