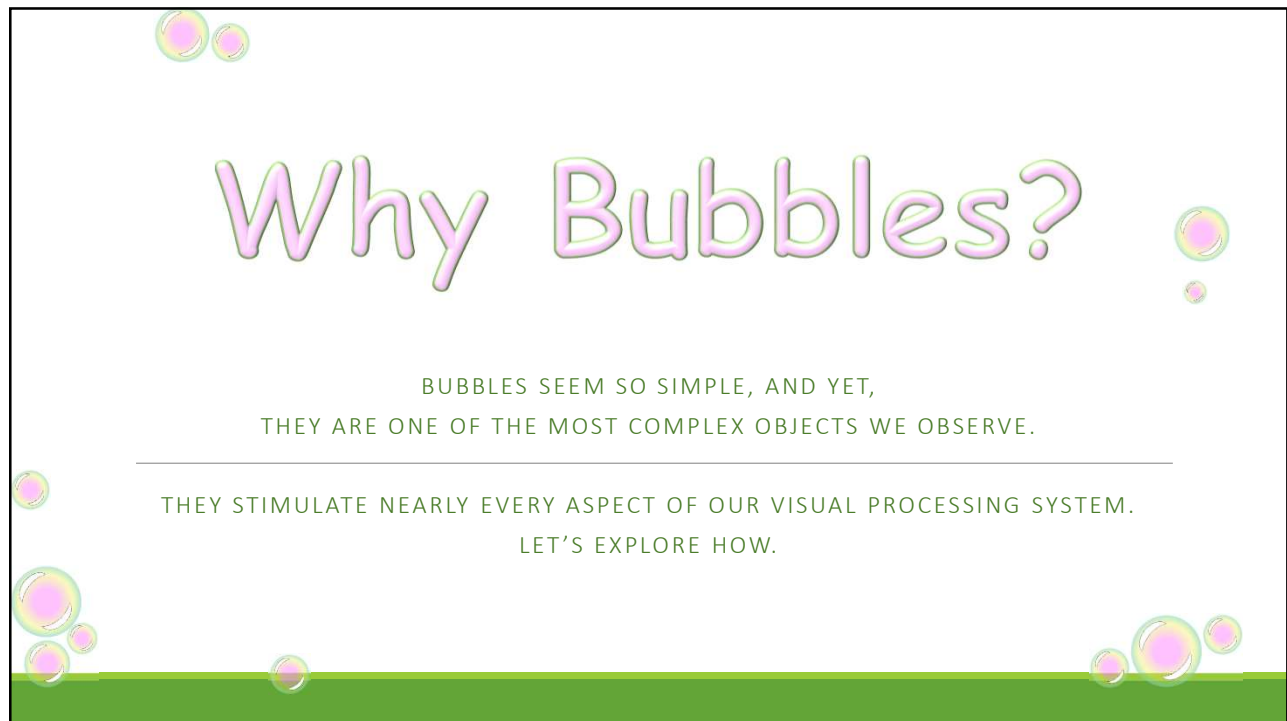


1



2

Anatomy of a Bubble

Outer surface – Soap and water solution shell

Inner Containment – Air typically exhaled

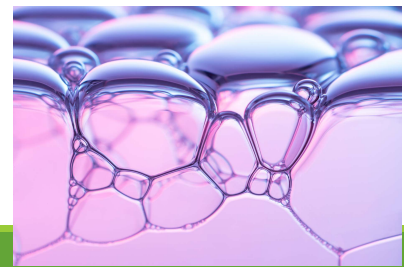
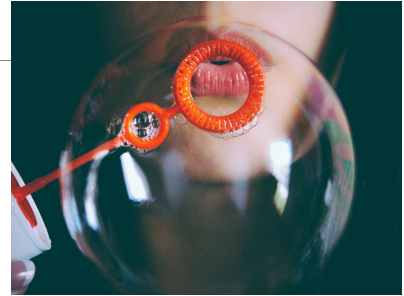
Shape – Sphere unless in contact with other bubbles

Color – Dependent on Thickness of outer shell

Reflection – Orientation is variable

Bubble cluster – Multiple bubbles in contact with each other

Bubble spray – Mist produced after a bubble is popped



3

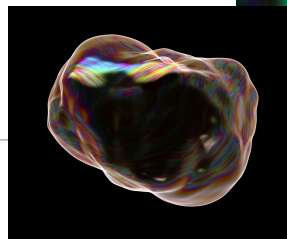
Size & Shape

Shape


- Typically, spherical
- Bigger bubbles deform
- Clusters form various 3D shapes
- Deforms typical sphere shape into various cuboids, wedges, etc.

Size

- Varies Drastically from large to tiny
- No two are the same size!
- Dependent on size of wand and breath used to create bubbles
- Often Consistent once bubble is produced
- Bubbles conjoining or splitting




4




Number

- Single**
 - Novel
 - Attention grabbing
- Few individuals**
 - Comparisons
- Dozens of individuals**
 - Peripheral stimulation
 - Peripheral motion
- Clusters**
 - Bubble interactions
 - Size/shape changes



5



Motion

- Contain greater percentage of CO₂
 - Float but fall faster than air
 - Heat of breath vs. cold air causes float
- Falling slower than gravity
 - Heavier bubbles fall faster
 - Bigger does not equal heavier
- Falling/floating at different speeds
- Various motions within a bubble shower

Breeze blown bubbles
Coming towards you
Moving away from you
Falling down to you

6

Layers, Depth, & Periphery



Depth perception

- Reaching to pop near or distant bubbles
- Convergence/Divergence

Layers of bubbles

- Physiological Diplopia
- Parallax

Periphery

- Bubble gun shower
- Movement on all sides in different speeds and directions with all different sizes

7

Color & Reflection

Rainbow colored

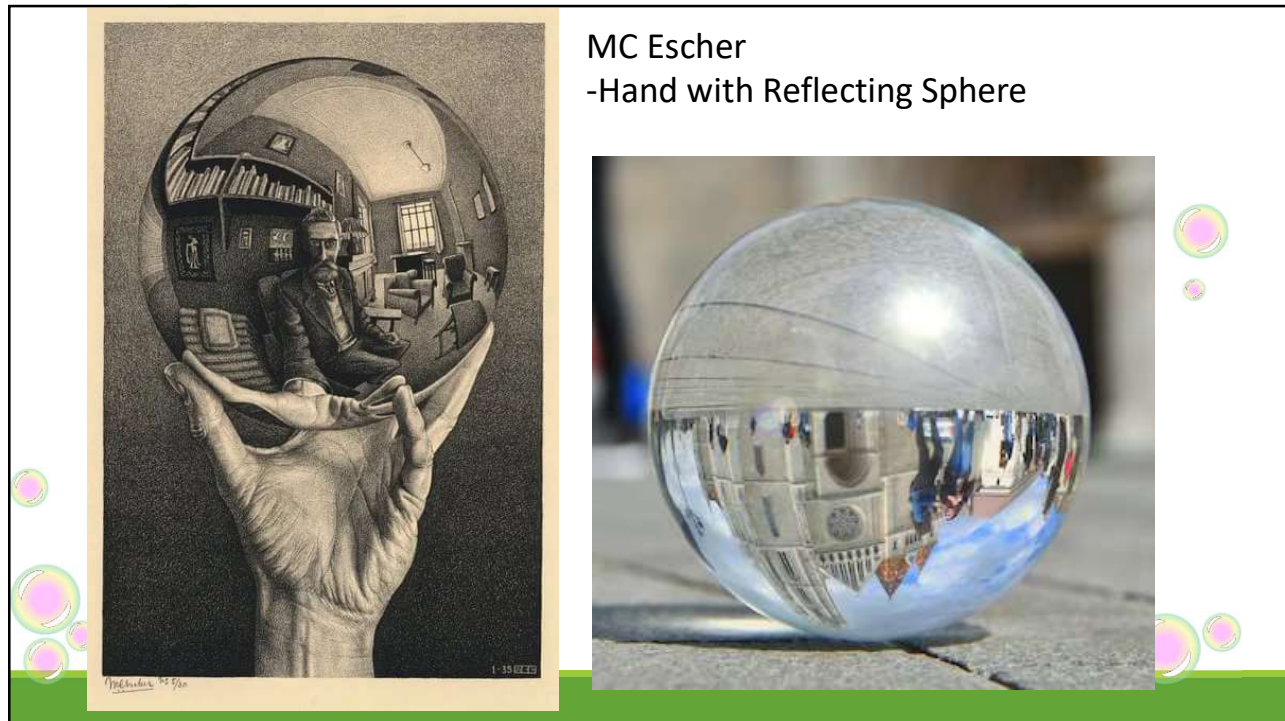
- Dependent on Thickness of outer shell
- Thick (typical fresh bubble): Rainbow, oil slick
- Thin (partially evaporated): Clear with white reflections
- Color change with length of time
- Super thin, almost invisible bubbles

Reflection

- Orientation Dependent on refraction
- Right-side up vs. Up-side down
- Size of the bubble
- Distance from bubble



8



MC Escher
-Hand with Reflecting Sphere

9



Coordination

Pop a bubble

- With a finger = Fine motor & Saccades
- With a tool
- Bubble spray - neural feedback
- Instant disappearance = Change in vergence and accommodation

Catch a bubble

- With the wand = Aiming & Pursuits
- Multiple bubbles in a cluster = Balance
- Can't move too fast or they fall or pop

Keep a bubble floating

- with breath or fan

10

Ocular Motor

Pursuits

- Catch a bubble on the wand
- Watch this bubble fall
- Keep the bubble in the air

Saccades

- Pop as many bubbles as you can with your fingers

Fixation

- Hold bubble on wand, watch it wiggle



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Bubble Conclusion

Visual discrimination

Form consistency

Figure-ground

Visual-spatial

Visual motor integration

Ocular motor control

Accommodation

Vergence

Depth Perception

Motion Relations

Neural feedback

Peripheral stimulation

Bilateral coordination

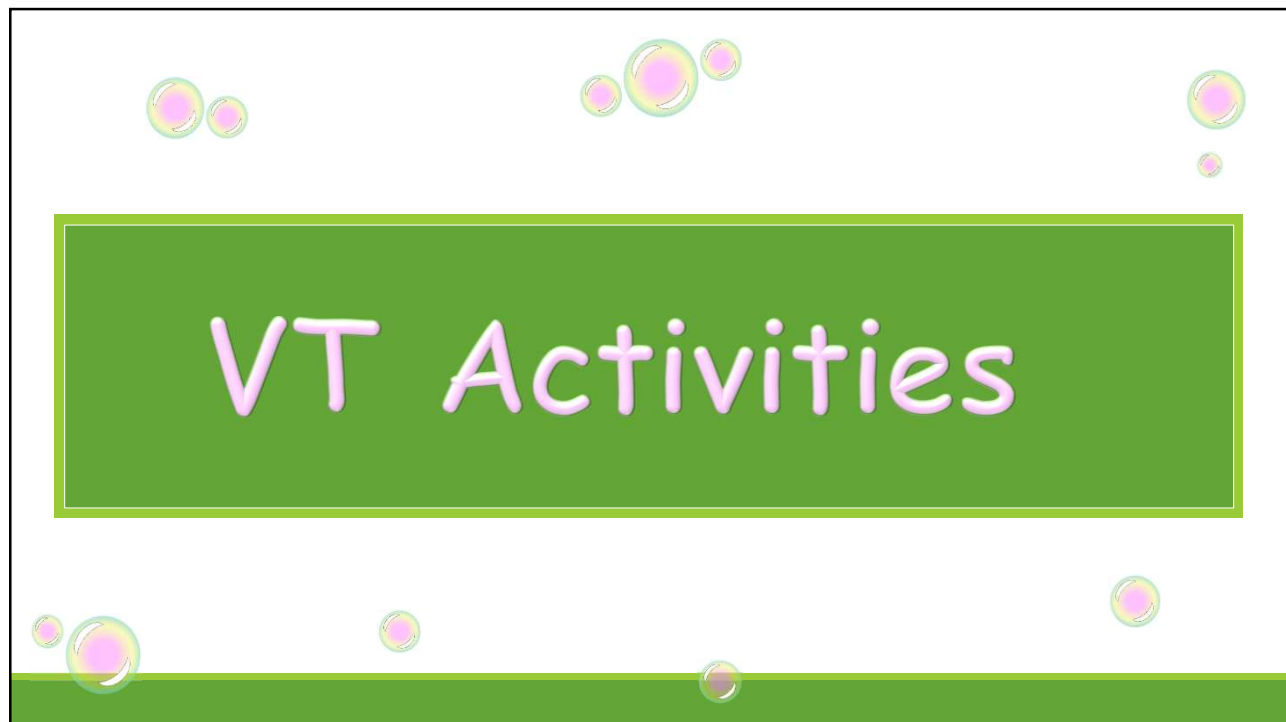
Fine motor control

Breath control

To name a few.....



12



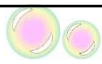
13

Bubble Tracking

THE ACTIVITY AND VARIATIONS	RELEVANT VISUAL SKILLS
Bubbles falling on patient laying prone	Pursuits
Bubbles floating past patient	Visual discrimination
Bubbles floating away from patient	Figure-ground
Size relations	Depth perception
Motion relations	Vergences
Great for low mobility patients and infants!	Visual-spatial
	Parallax

 A photograph of a young child with dark skin and curly hair, wearing a pink and white striped shirt, blowing bubbles. The child is looking to the right, and many colorful bubbles are floating in the air around them.

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Bubble Pop

THE ACTIVITY AND VARIATIONS

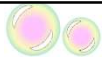
Pop bubbles with finger/tool
 Pop with a pinch
 Pop in a time limit
 Pop in size order
 Pop before they hit the ground
 Pop to a metronome
 Add a balance board
 Keep your eyes converged at the point where the bubble popped

RELEVANT VISUAL SKILLS

Saccades
 Pursuits
 Visual discrimination
 Figure-ground
 Depth perception
 Vergences
 Coordination
 Visual-spatial
 Palmer reflex



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Bubble Catch

THE ACTIVITY AND VARIATIONS

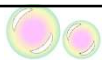
Catch single bubble on the wand
 Catch multiple bubbles on the wand
 Catch bubble in a cup

RELEVANT VISUAL SKILLS

Fixation
 Pursuits
 Visual discrimination
 Figure-ground
 Depth perception
 Vergences
 Coordination
 Visual-spatial



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Bubble Blow

THE ACTIVITY AND VARIATIONS

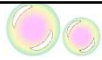
- Fixation on the bubble wand
- Blow many bubbles at once
- Blow a big bubble
- Blow a small bubble and increase the size of the next bubble
 - Repeat in sequence
- Blow bubbles into a goal
- Blow bubbles in a pattern
 - I.e: while turning in a circle

RELEVANT VISUAL SKILLS

- Fixation
- Pursuits
- Visual discrimination
- Depth perception
- Vergences
- Coordination
- Visual-spatial
- Rooting Reflex
- Visual sequential memory



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Bubble Float

THE ACTIVITY AND VARIATIONS

- Keep a bubble floating by blowing on it
 - How long can you go?
 - Fan instead of breath
- Move bubble into goal with breath/fan

RELEVANT VISUAL SKILLS

- Fixation
- Pursuits
- Figure-ground
- Vergences
- Coordination
- Visual-spatial
- Rooting Reflex



18

Bubble Exploration

THE ACTIVITY AND VARIATIONS

Discussion and observation of the reflections in bubbles

- Can you find the window reflection?
- How do the colors change?
- Is the reflection right-side up or up-side down?
- Do the colors swirl?


RELEVANT VISUAL SKILLS

Fixation

Accommodation

Visual discrimination

Vergences



19

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Break Out Question

Bubbles are enjoyed by children and adults alike, from childlike screams of laughter to a simple smirk. Could this psychological effect of joy be stimulated by the visual complexity of bubbles? What may be the neurological pathway for this stimulation?

So Why Bubbles?

Stimulates so much of our vision
One of the most visually complex objects in existence

But above all...

Fun!

Which Increases Patient Compliance!

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