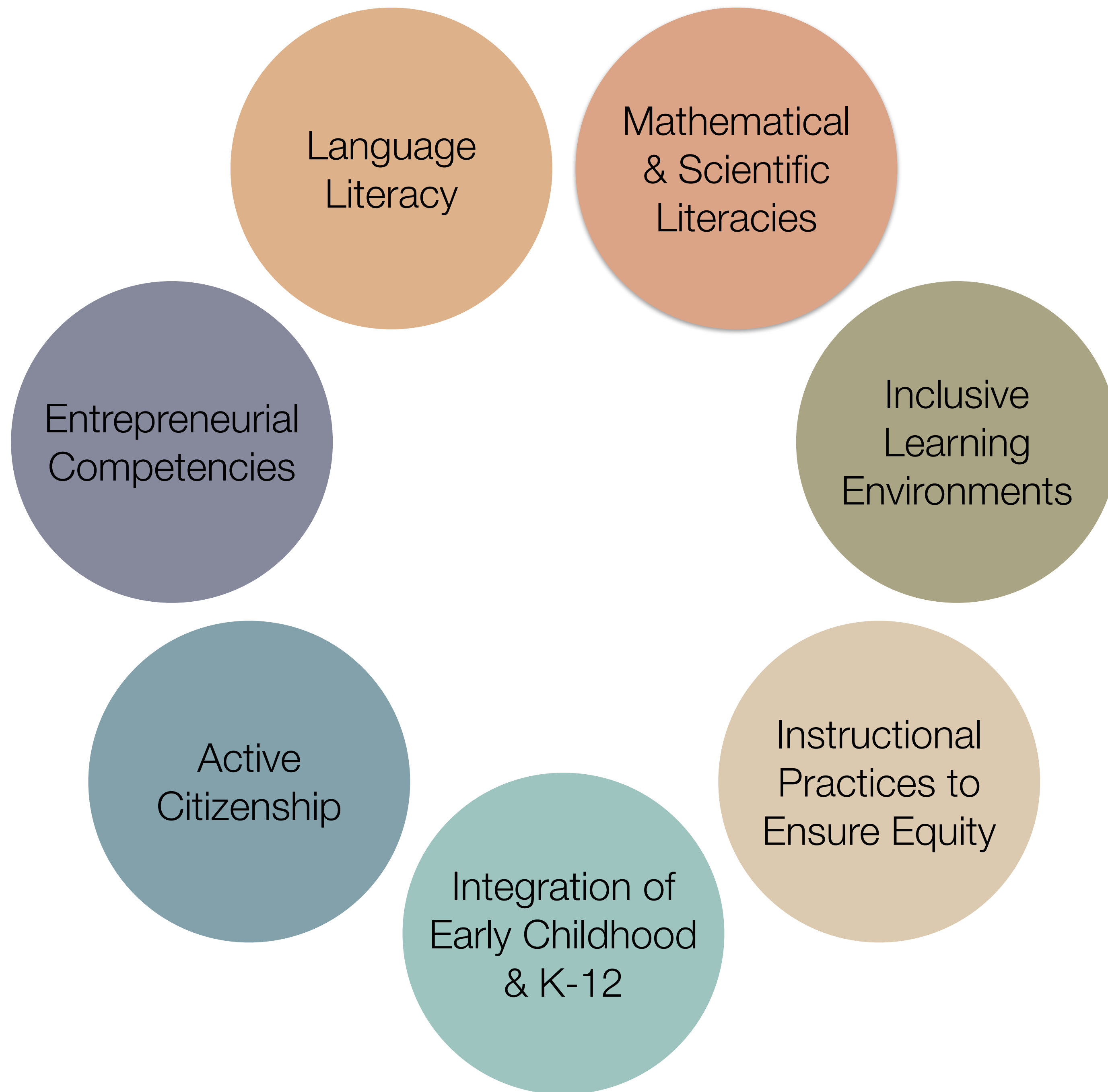


# Designing for Transformation: An Integrated Perspective

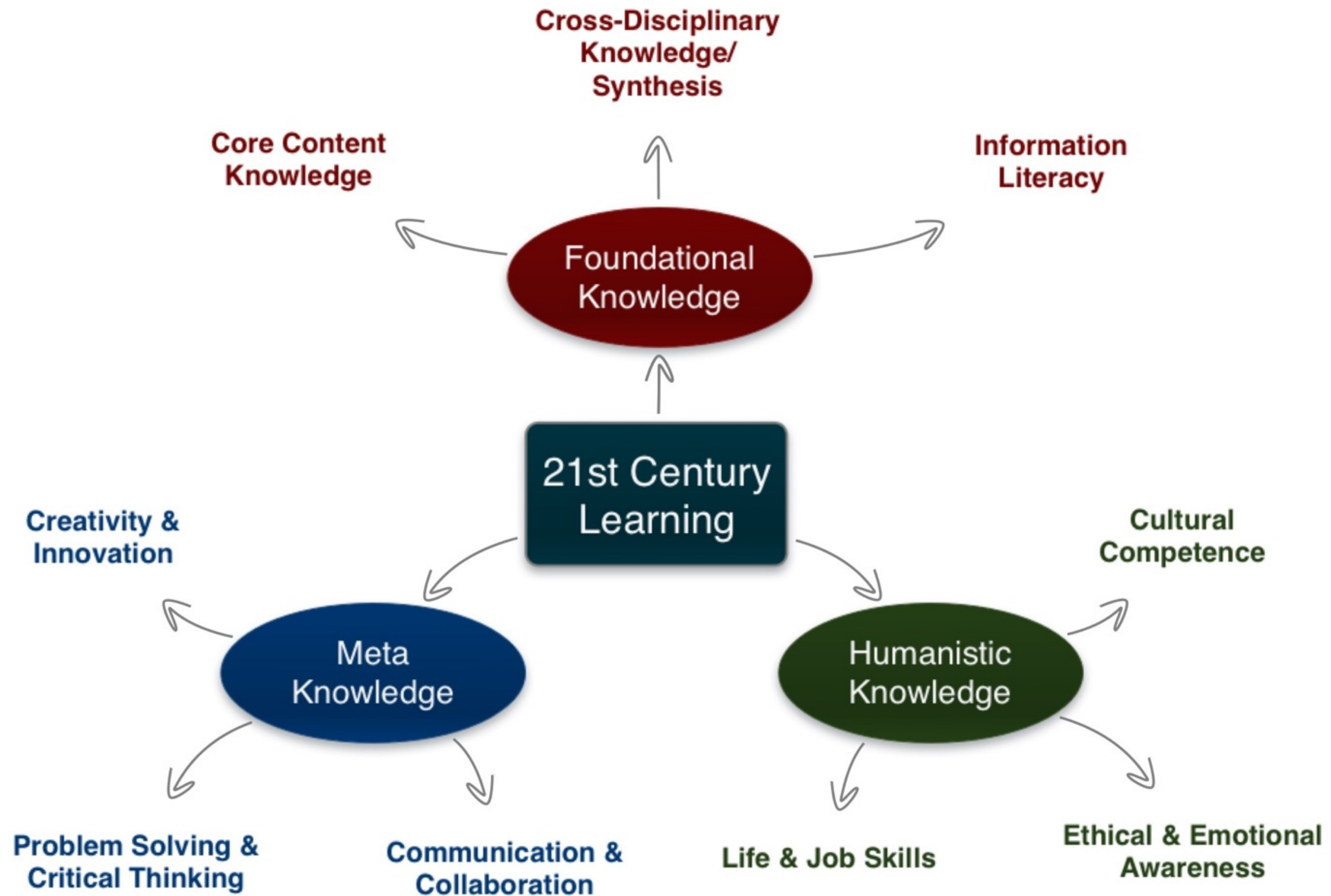
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Ruben R. Puentedura, Ph.D.











## Transformation

### **Redefinition**

*Tech allows for the creation of new tasks,  
previously inconceivable*

### **Modification**

*Tech allows for significant task redesign*

---

### **Augmentation**

*Tech acts as a direct tool substitute, with  
functional improvement*

### **Substitution**

*Tech acts as a direct tool substitute, with no  
functional change*

## Enhancement



# Redefinition

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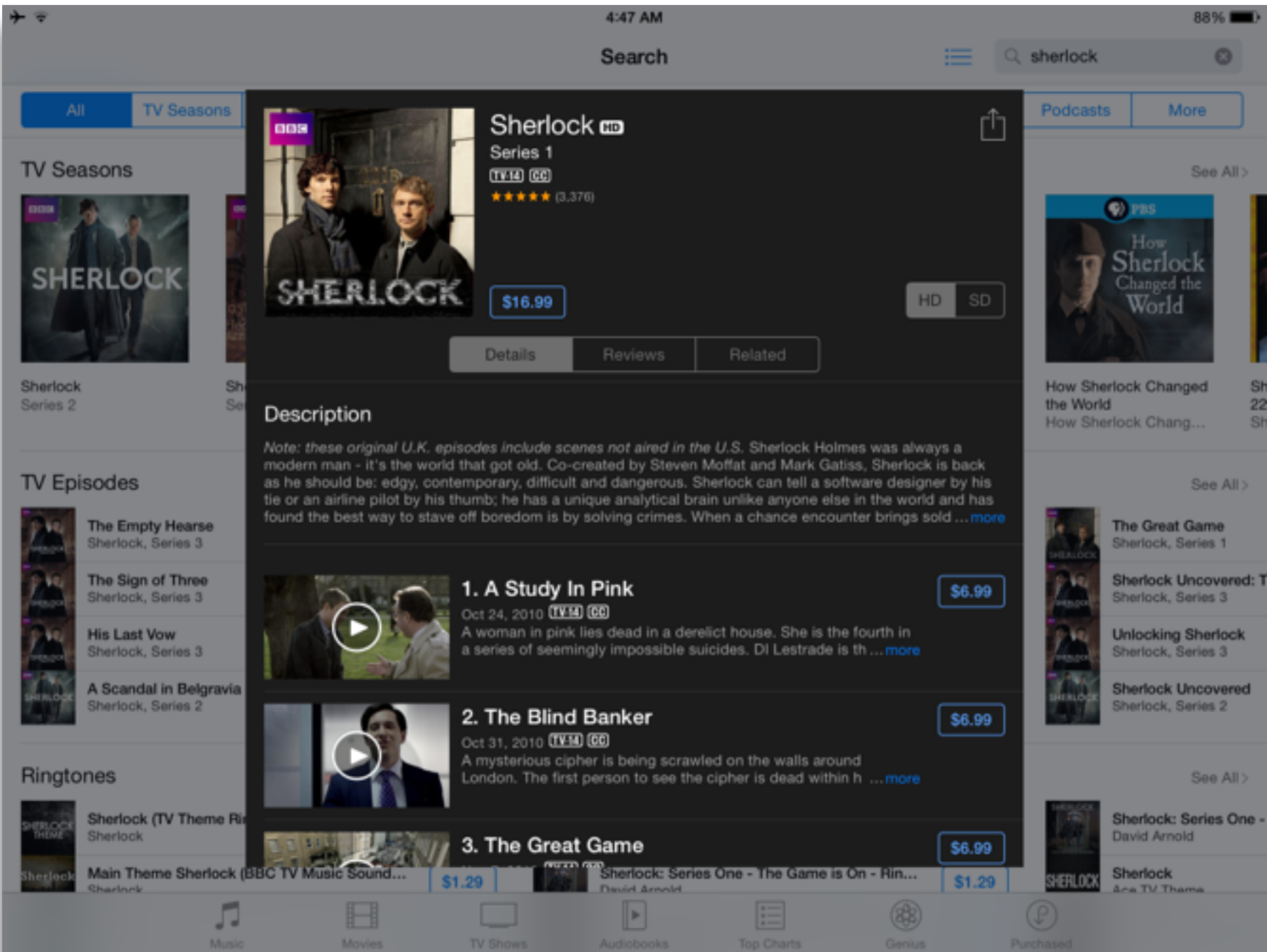
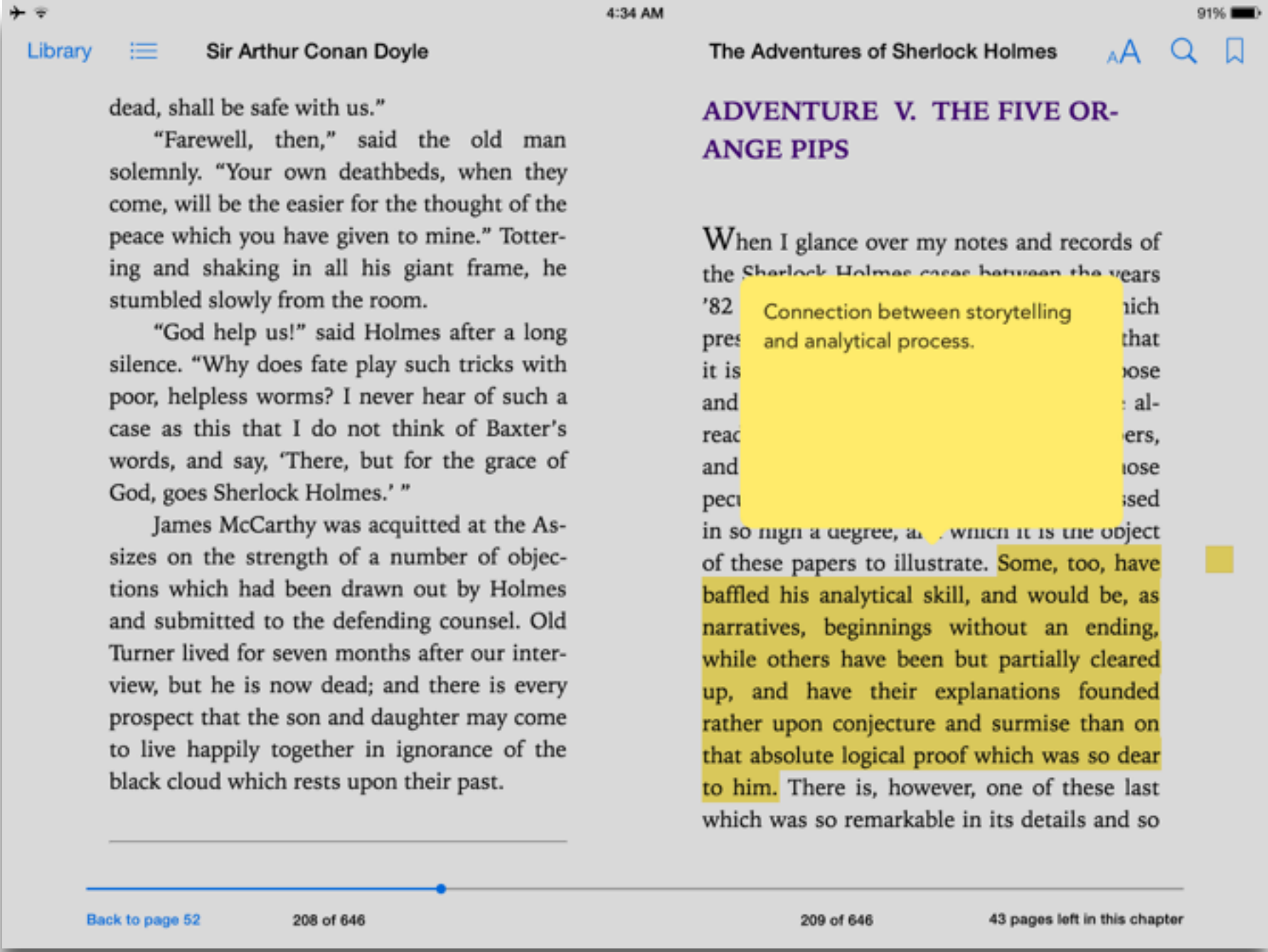
Tech allows for significant task redesign

# Augmentation

Tech acts as a direct tool substitute, with functional improvement

# Substitution

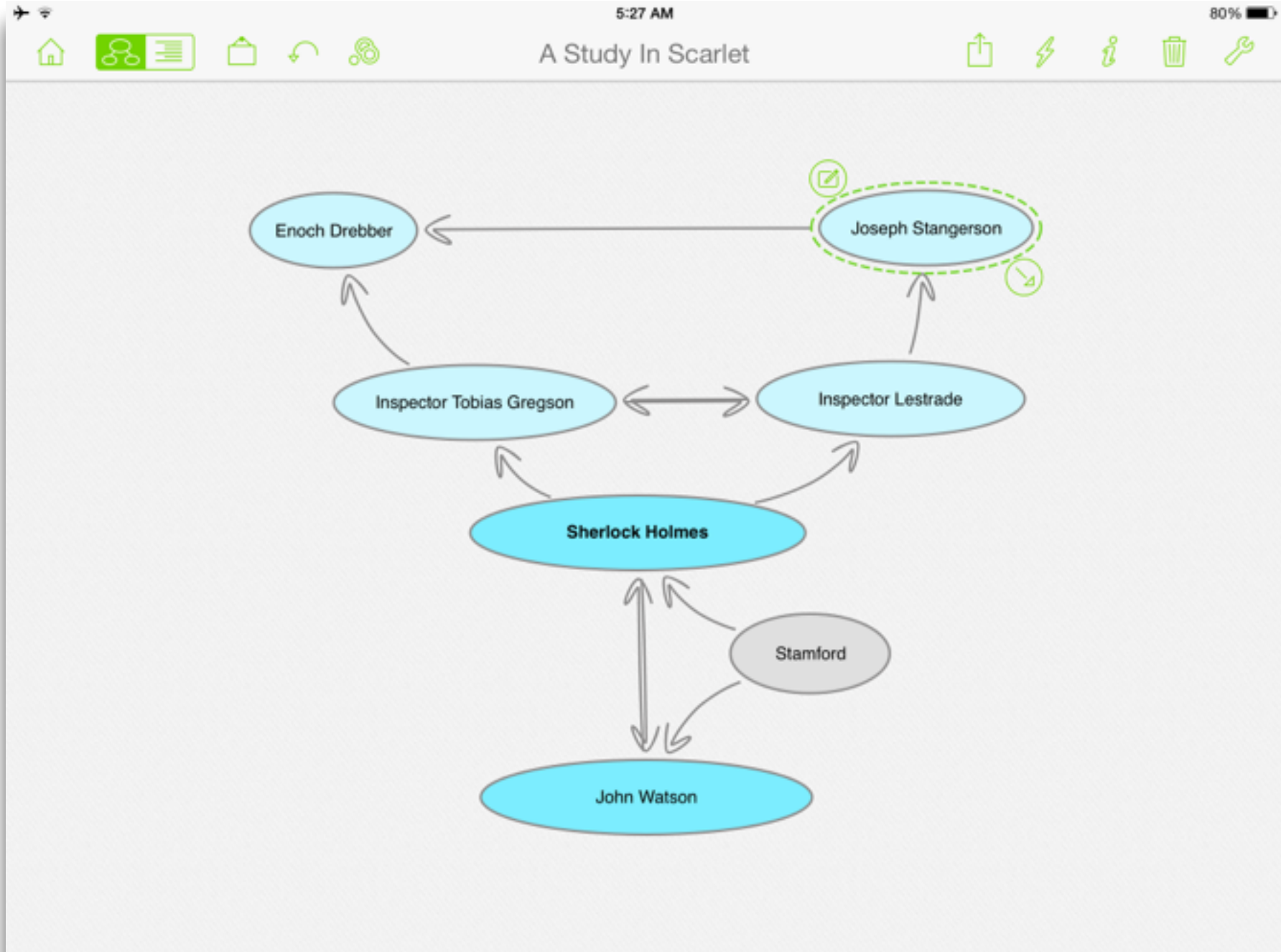
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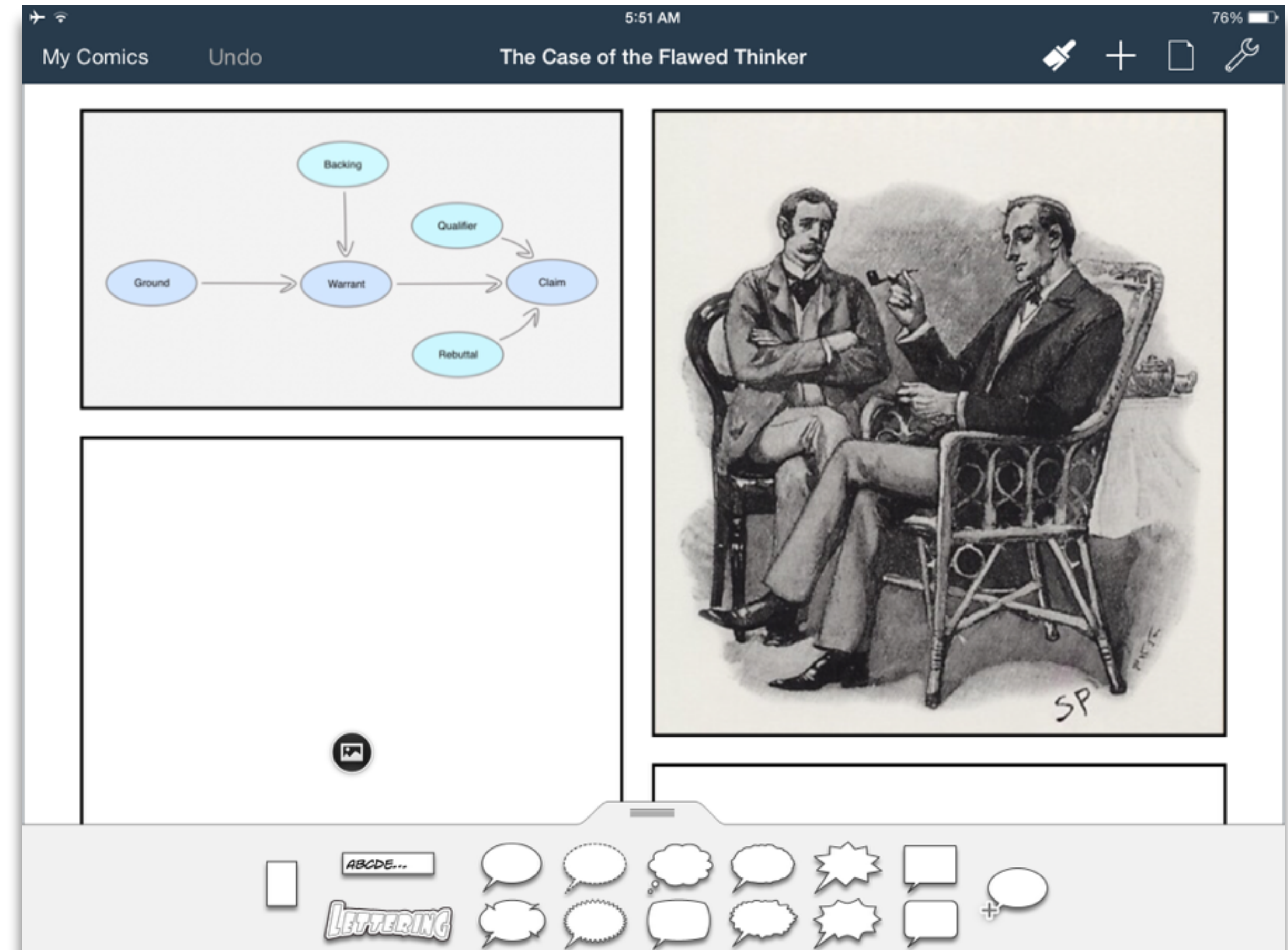
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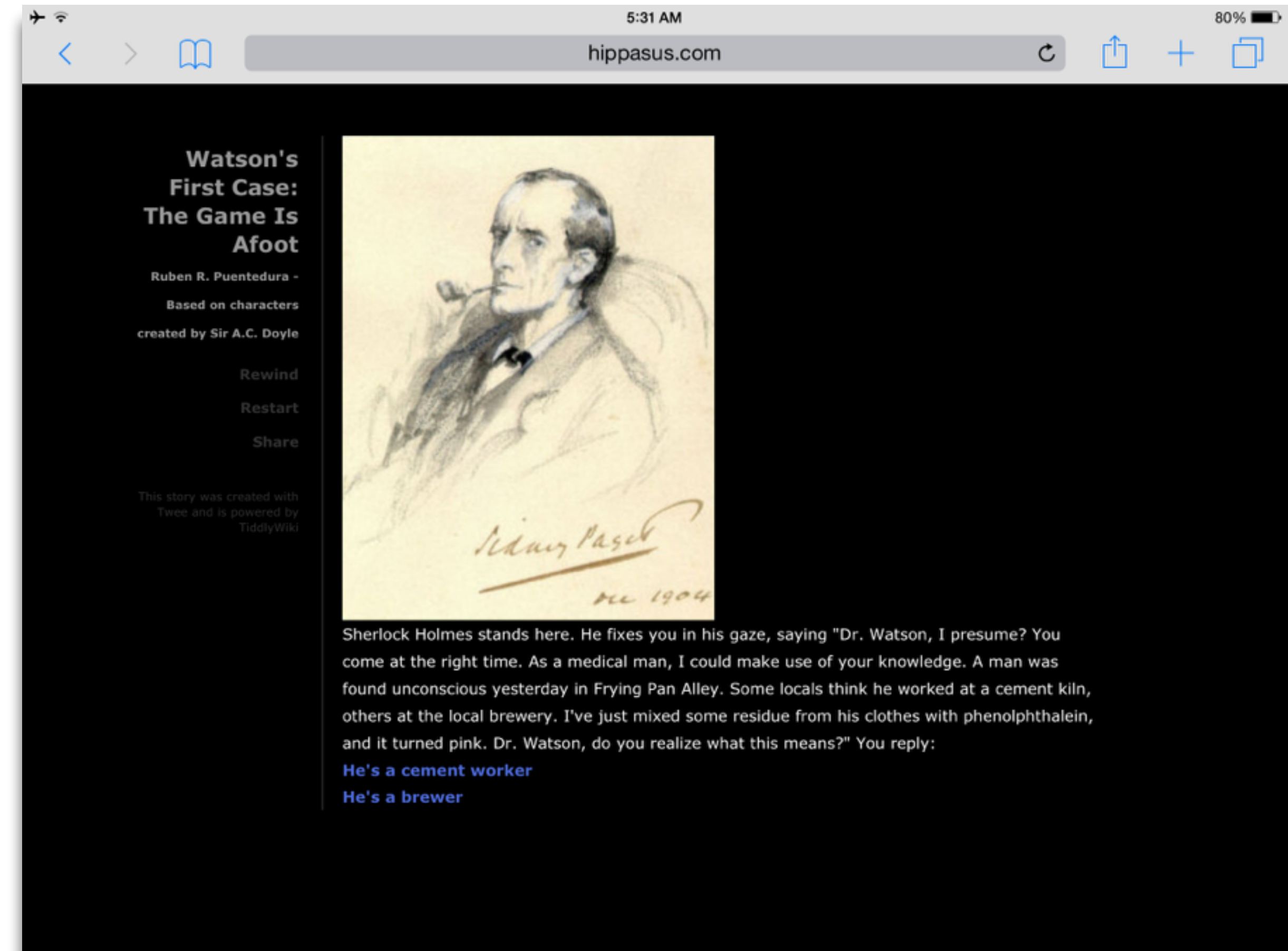
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Meta-analysis	Number of studies	<i>ES</i> type	Mean <i>ES</i>	<i>SE</i>
Bangert-Drowns (1993)	19	Missing	0.27	0.11
Bayraktar (2000)	42	Cohen's <i>d</i>	0.27	0.05
Blok, Oostdam, Otter, and Overmaat (2002)	25	Hedges's <i>g</i>	0.25	0.06
Christmann and Badgett (2000)	16	Missing	0.13	0.05
Fletcher-Flinn and Gravatt (1995)	120	Glass's $\Delta$	0.24	0.05
Goldberg, Russell, and Cook (2003)	15	Hedges's <i>g</i>	0.41	0.07
Hsu (2003)	25	Hedges's <i>g</i>	0.43	0.03
Koufogiannakis and Wiebe (2006)	8	Hedges's <i>g</i>	-0.09	0.19
Kuchler (1998)	65	Hedges's <i>g</i>	0.44	0.05
Kulik and Kulik (1991)	239	Glass's $\Delta$	0.30	0.03
Y. C. Liao (1998)	31	Glass's $\Delta$	0.48	0.05
Y.-I. Liao and Chen (2005)	21	Glass's $\Delta$	0.52	0.05
Y. K. C. Liao (2007)	52	Glass's $\Delta$	0.55	0.05

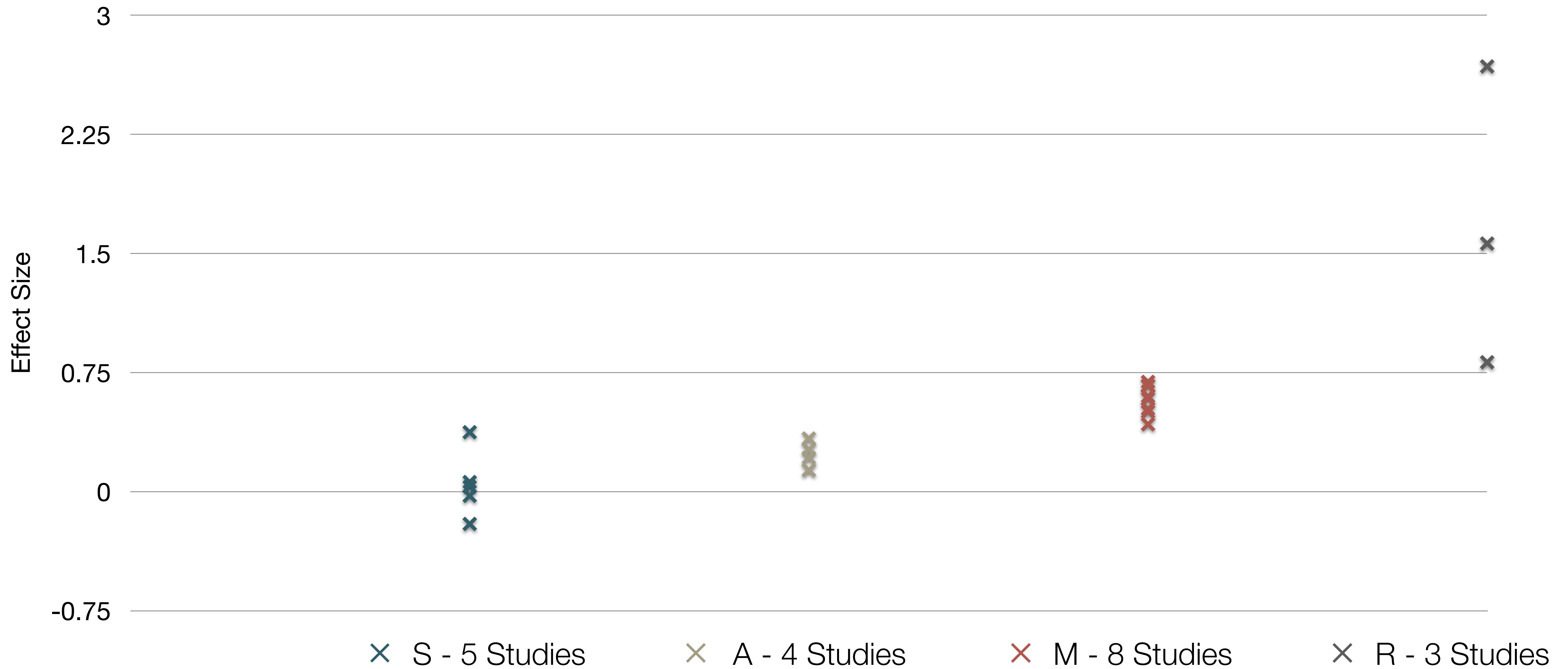
Meta-analysis	Number of studies	<i>ES</i> type	Mean <i>ES</i>	<i>SE</i>
Michko (2007)	45	Hedges's <i>g</i>	0.43	0.07
Onuoha (2007)	35	Cohen's <i>d</i>	0.26	0.04
Pearson, Ferdig, Blomeyer, and Moran (2005)	20	Hedges's <i>g</i>	0.49 <sup>a</sup>	0.11
Roblyer, Castine, and King (1988)	35	Hedges's <i>g</i>	0.31	0.05
Rosen and Salomon (2007)	31	Hedges's <i>g</i>	0.46	0.05
Schenker (2007)	46	Cohen's <i>d</i>	0.24	0.02
Soe, Koki, and Chang (2000)	17	Hedges's <i>g</i> and Pearson's <i>r</i> <sup>a</sup>	0.26 <sup>a</sup>	0.05
Timmerman and Kruepke (2006)	114	Pearson's <i>r</i> <sup>a</sup>	0.24	0.03
Torgerson and Elbourne (2002)	5	Cohen's <i>d</i>	0.37	0.16
Waxman, Lin, and Michko (2003)	42	Glass's $\Delta$	0.45	0.14
Yaakub (1998)	20	Glass's $\Delta$ and <i>g</i>	0.35	0.05
Zhao (2003)	9	Hedges's <i>g</i>	1.12	0.26

a. Converted to Cohen's *d*.



Study	SAMR Level	Description	Effect Size
Ligas (2002)	S	CAI system used to support direct instruction approach for at-risk students.	<b>0.029</b> (50th perc. → 51st perc.)
Xin & Reith (2001)	A	Multimedia resources provided to contextualize learning of word meanings and concepts.	<b>0.264</b> (50th perc. → 60th perc.)
Higgins & Raskind (2005)	M	Software/hardware used for text-to-speech, definitions, pronunciation guide for children with reading disabilities.	<b>0.600</b> (50th perc. → 73rd perc.)
Salomon, Globerson & Guterman (1989)	R	Software presents students with reading principles and metacognitive questions as part of the reading process.	<b>1.563</b> (50th perc. → 94th perc.)

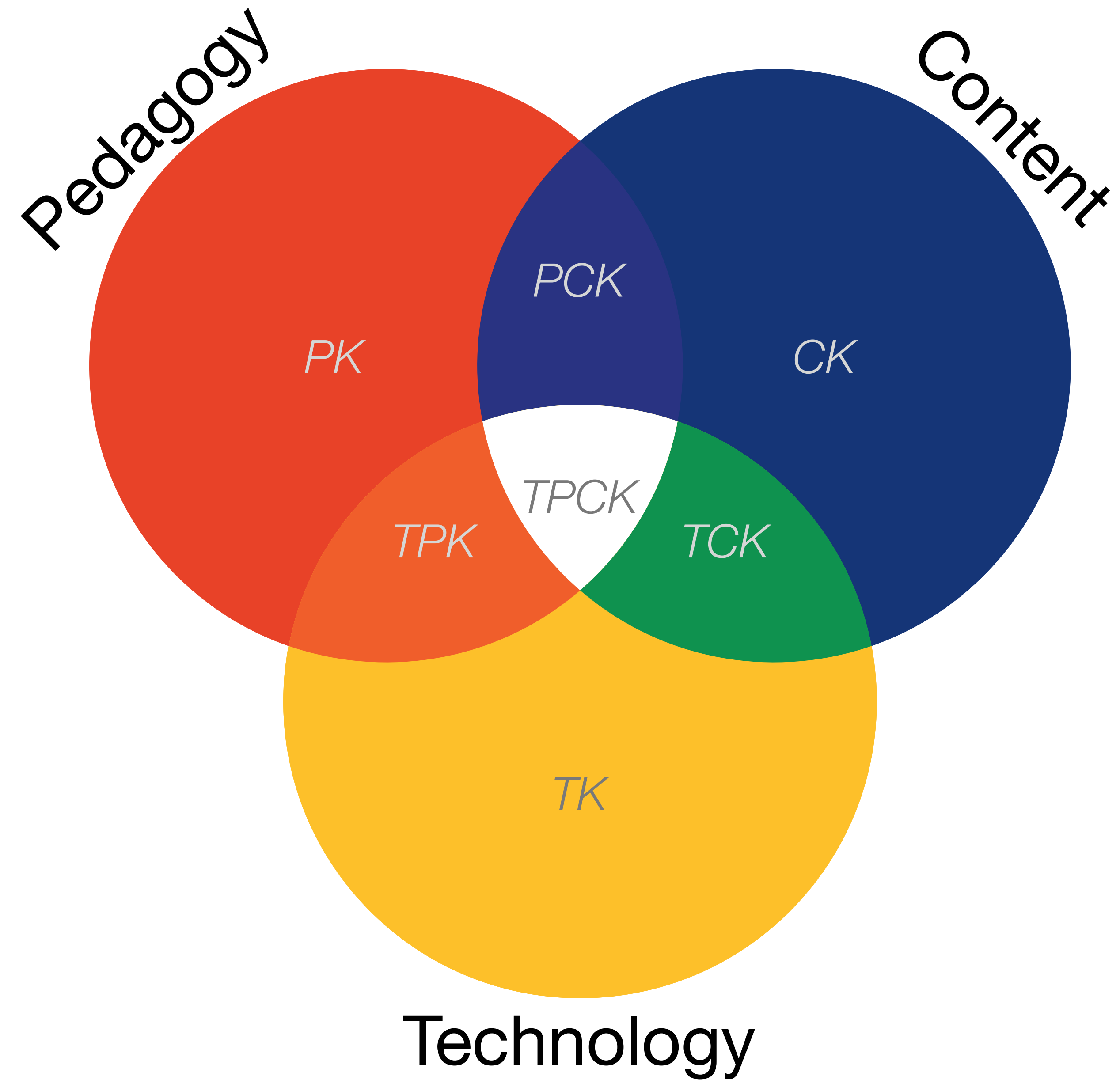






Study	SAMR Classification	Description	Effect Size
<b>Algebra I</b> <i>Effectiveness of Cognitive Tutor Algebra I at Scale</i> , by John F. Pane, Beth Ann Griffin, Daniel F. McCaffrey, Rita Karam	<b>S to A</b>	<b>S:</b> Computerized algebra drills, some tied to real-world scenarios <b>A:</b> Tools for basic visualization; adaptive response to student progress	$\approx 0.2$ 50th perc. → 58th perc.
<b>Earth Science</b> <i>Using Laptops to Facilitate Middle School Science Learning: The Results of Hard Fun</i> , by Alexis M. Berry, Sarah E. Wintle	<b>A to M</b>	<b>A:</b> Interactive tools for concept exploration and visualization <b>M:</b> Narrated animation as final project	$\approx 0.6$ 50th perc. → 73rd perc. ( $\approx 1.4$ a month later) (50th perc. → 92nd perc.)









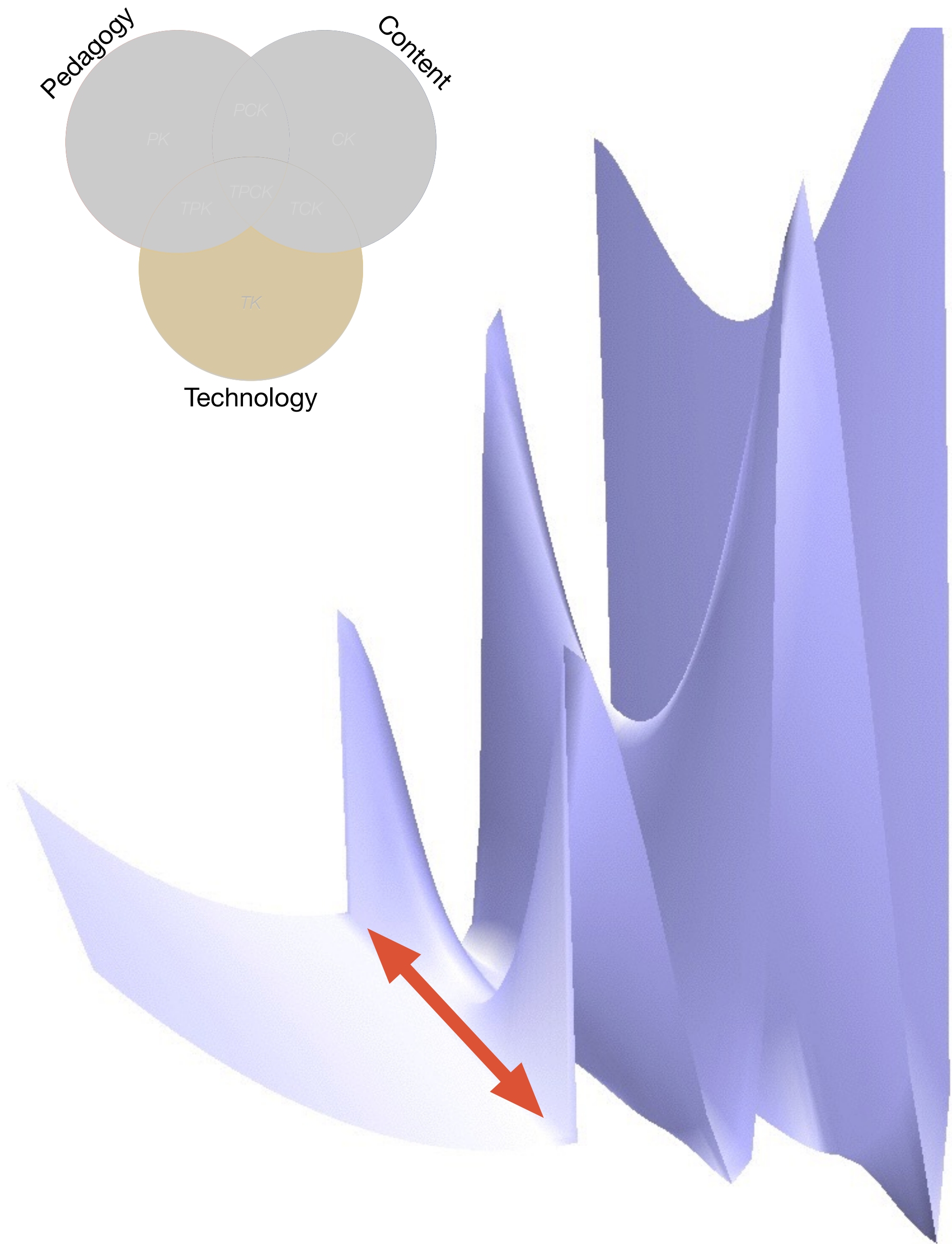


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### Aquatic Biomes

Aquatic biomes cover 75 percent of the surface of the Earth. The aquatic and terrestrial biomes are similar in some ways

**bi•ome** | 'bī,ōm |  
noun Ecology  
a large naturally occurring community of flora and fauna occupying a major habitat, e.g., forest or tundra.

ORIGIN early 20th cent.: from BIO- 'life' + -OME

Search Web

Search Wikipedia

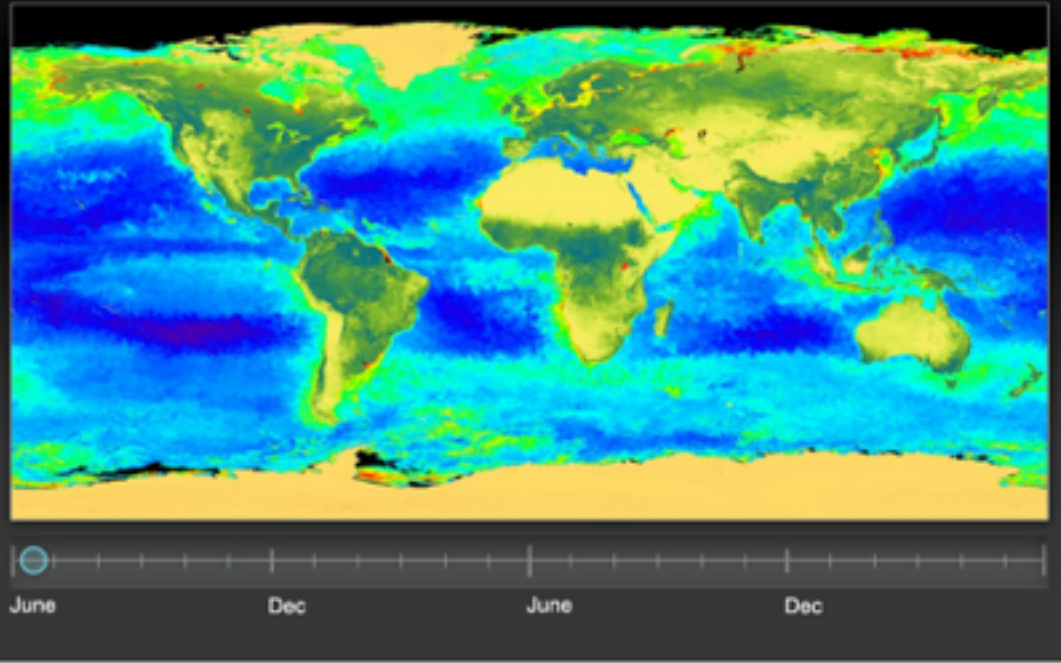
ns, the ability of is the food nt for arth and ous oxy- carbon oy pro- nts. d ma- on of dis- dissolved salts (0.05 percent), whereas ocean water has about 35,000 parts per million (3.5 percent).

Some aquatic organisms are adapted to both conditions for parts of their lives, such as salmon and some eels, but it

is more common for organisms to be confined to one of the two environments.

Aquatic environments have less variation globally than those on land. Taking a broad view (the lumpers' perspective), there are four kinds of aquatic biomes: surface waters, deep waters, shores, and bottoms. Within these categories are a variety of distinctive marine and freshwater life zones that are frequently designated as separate biomes.

#### Worldwide Photosynthetic Activity



June Dec June Dec

**Interactive** The latitudes of peak photosynthesis change with the seasons.

31

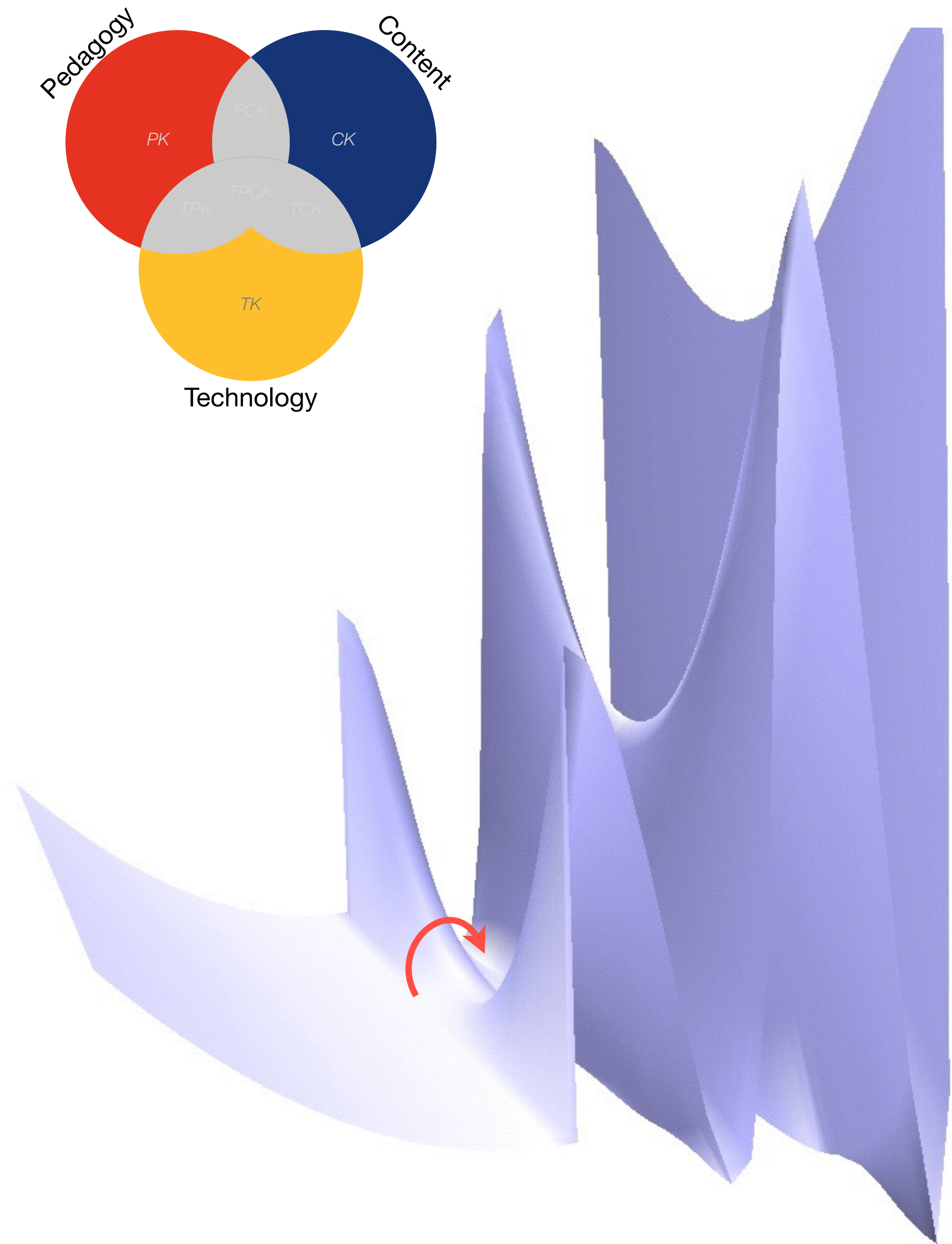


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# Augmentation

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**EUROASIAN COLLARED-DOVE**  
*Streptopelia decaocto*  
 Locally common, exotic

---

12½–13 in. (32–33 cm)  
 Recent colonizer of N. America from Caribbean but native to Eurasia; rapidly increasing and spreading. Slightly chunkier than Mourning Dove, *paler beige*, and with *square-cut tail*. Note *narrow black ring on hindneck*. *Grayish undertail coverts*. Three-toned wing pattern in flight.

**SPOTTED DOVE**  
*Streptopelia chinensis*  
 Uncommon, local, exotic

---

12 in. (30–31 cm)  
 Note *broad collar of black and white spots* on hindneck. A bit larger than Mourning Dove; tail rounded with much white in corners. *Juvenile*: Lacks collar, but can be told by shape of spread tail.

**ROCK PIGEON (ROCK DOVE, DOMESTIC PIGEON)**  
*Columba livia*  
 Common, exotic

---

12½ in. (32 cm)  
 Typical birds are gray with *whitish rump*, *two black wing bars*, and broad, dark tail band. Domestic stock or feral birds may have many color variants.

RED-BILLED PIGEON

AFRICAN COLLARED-DOVE

EURASIAN COLLARED-DOVE

SPOTTED DOVE

plumage variable

typical form

ROCK PIGEON (ROCK DOVE, DOMESTIC PIGEON)

**Bird Sighting**

Cancel Save

**ROCK PIGEON (ROCK DOVE, DOMESTIC PIGEON...)**

*Columba livia*

Common, exotic

Count 1 Bird >

Date Jun 9, 2012 4:35 PM >

Place >

Weather Not Recorded >

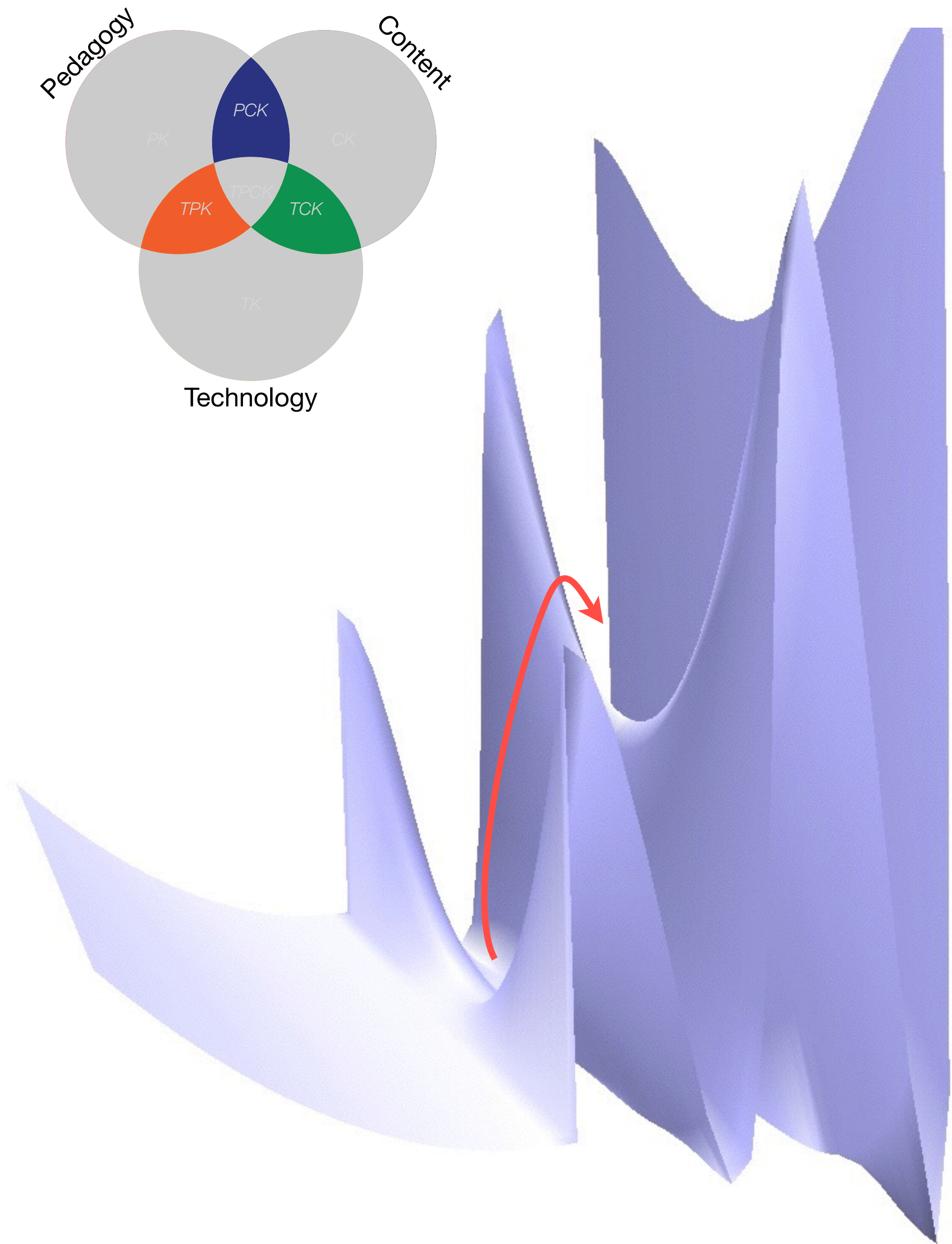


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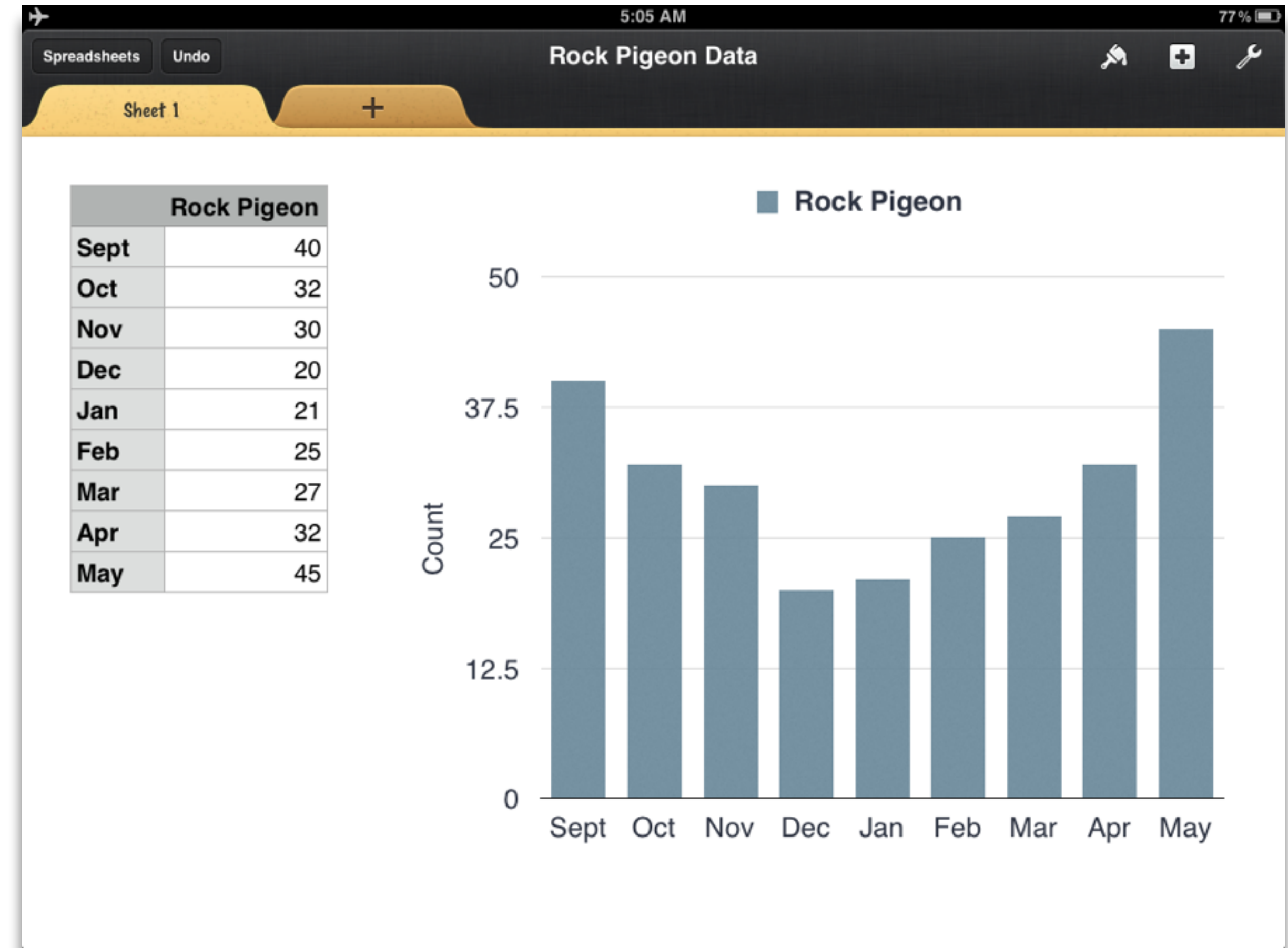
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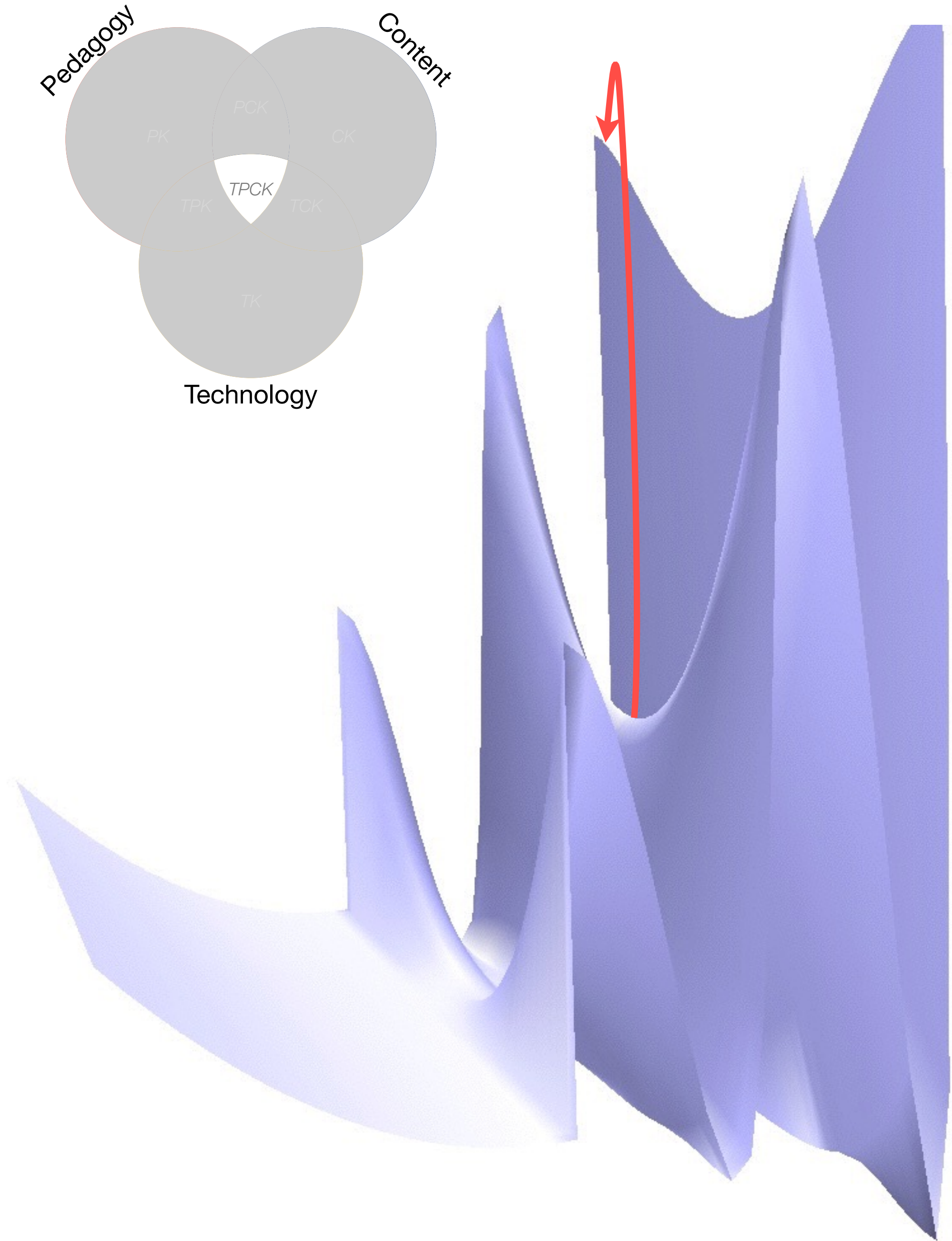


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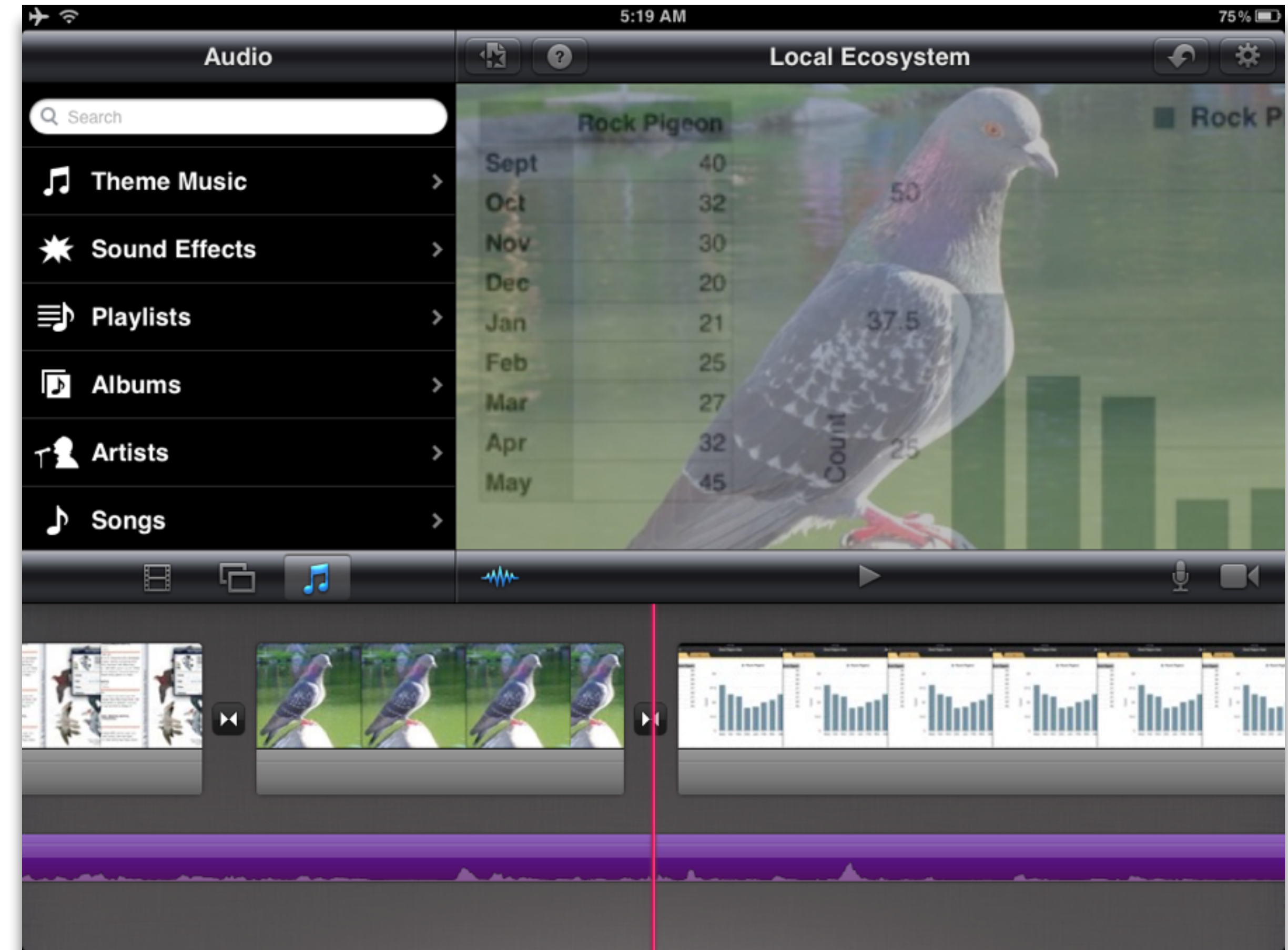
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Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
				



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200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
  				 



Bookmarks



RSS Feeds

Discussions



Microblogging

Blogging





Wikis

Telepresence



File Sharing

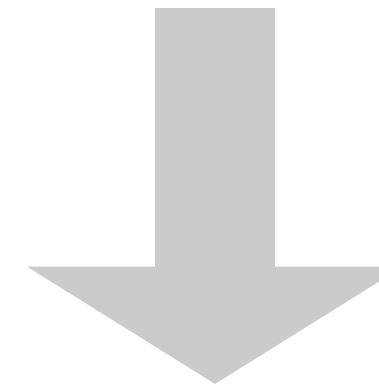


Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
  				 



Class

Homework



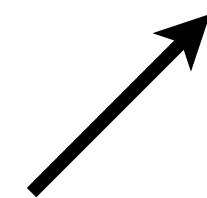
School

World

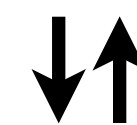
Home



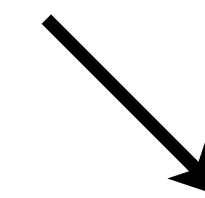
Learning Environments



*Contextual Search*  
*Augmented Reality*






*Cloud Resources*  
*Mobile Tools*



*Sensors*  
*Recorders*



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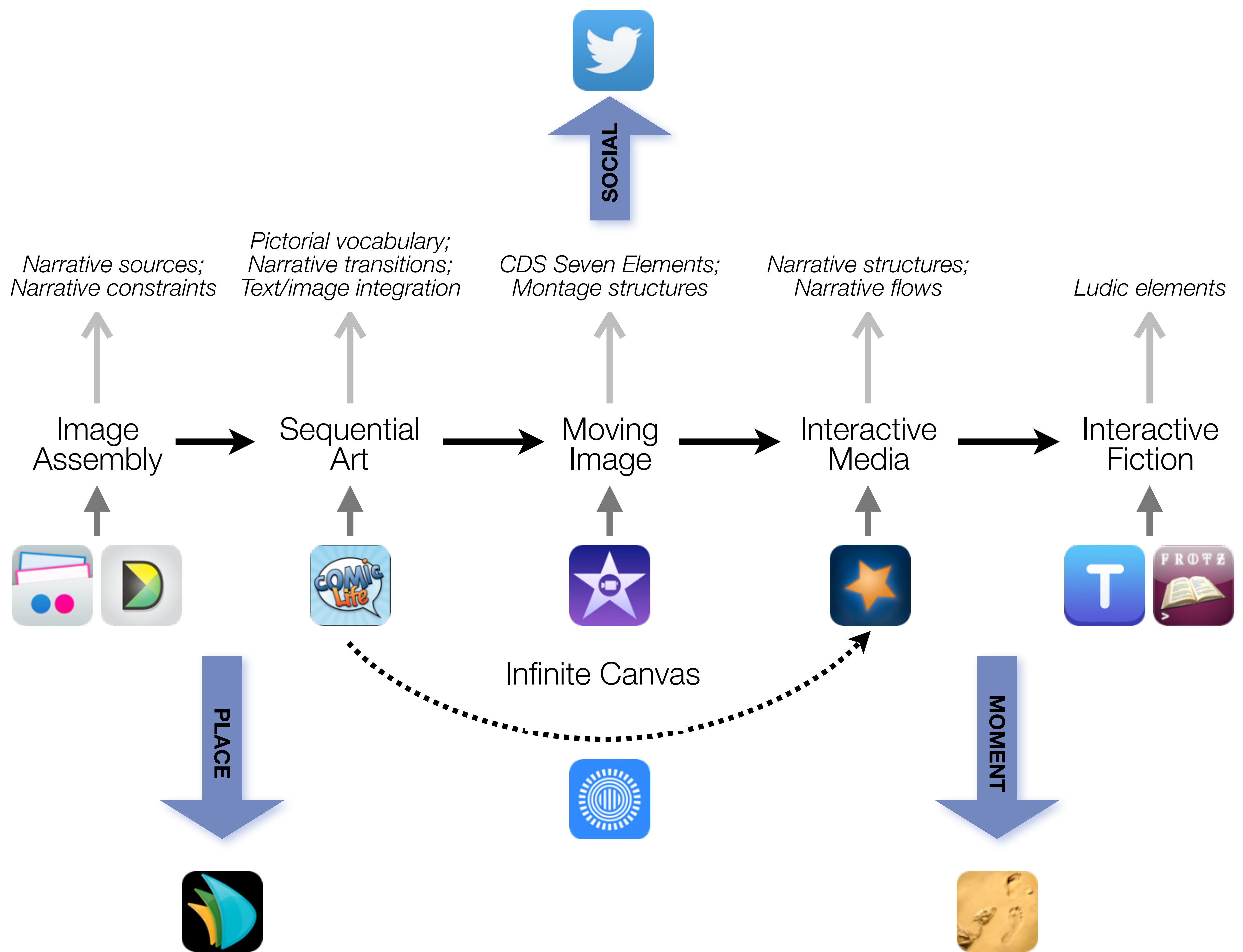






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## Formal Definition of **Game** (Salen & Zimmerman)

---

“A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.”



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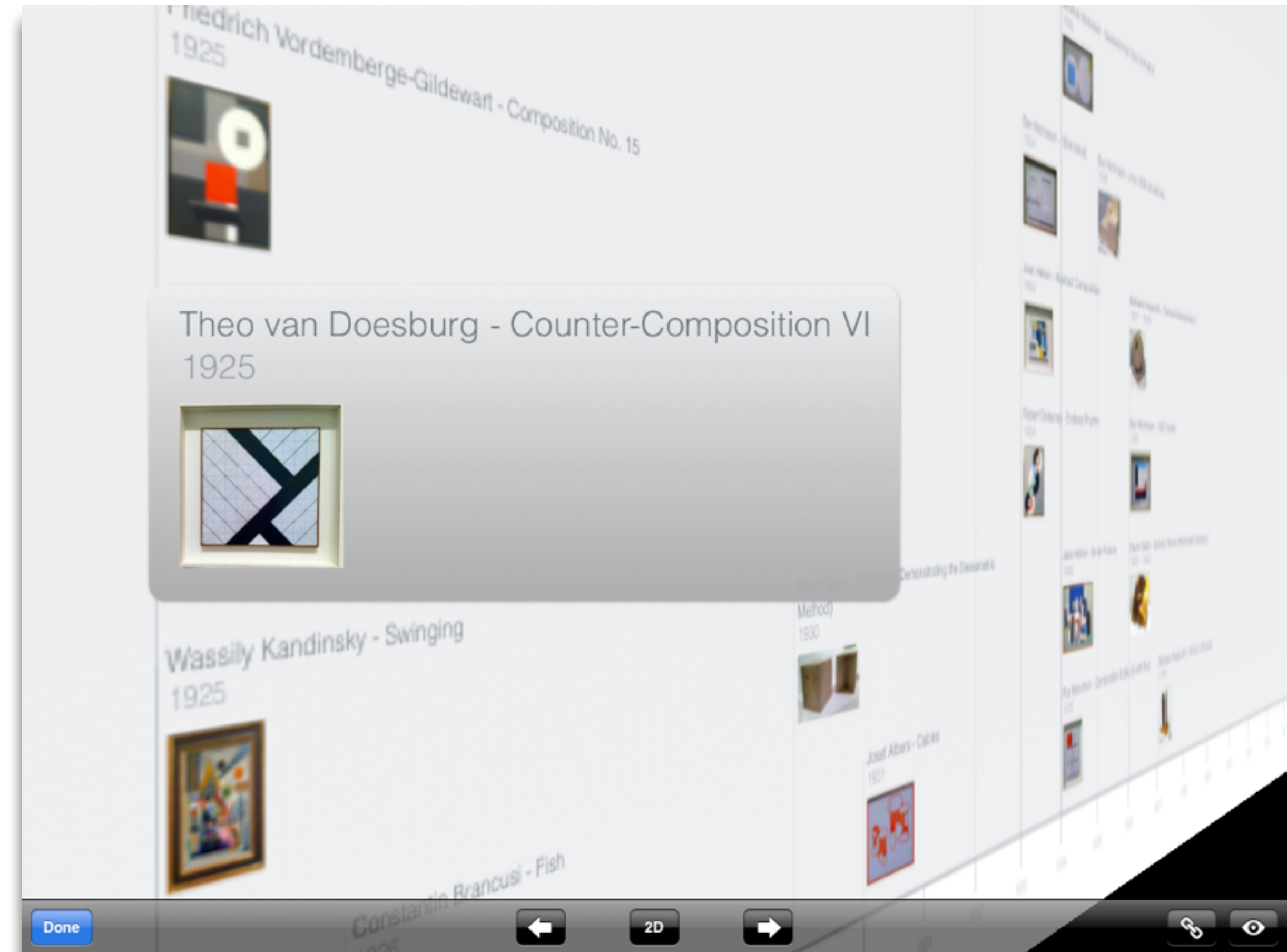
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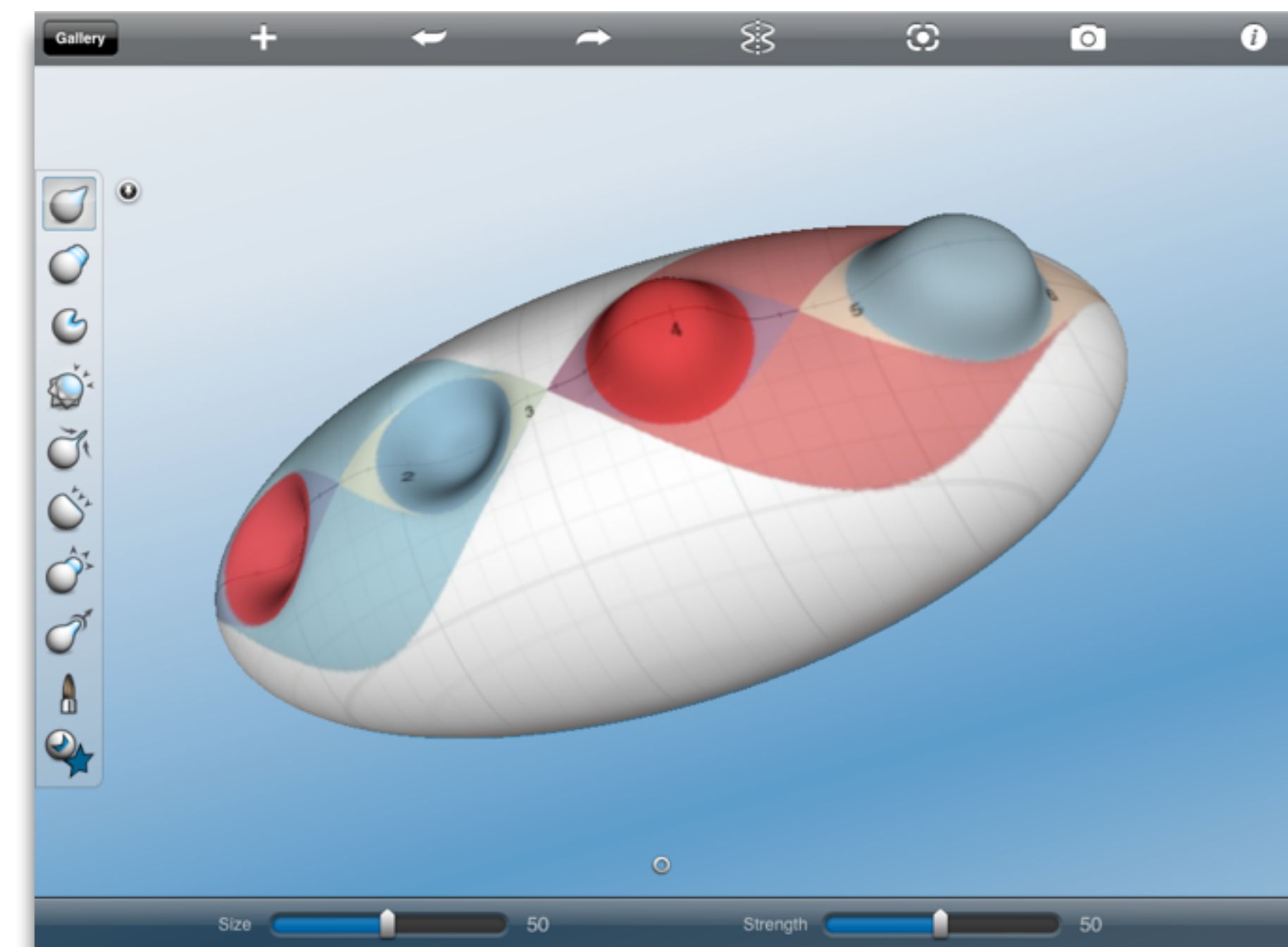
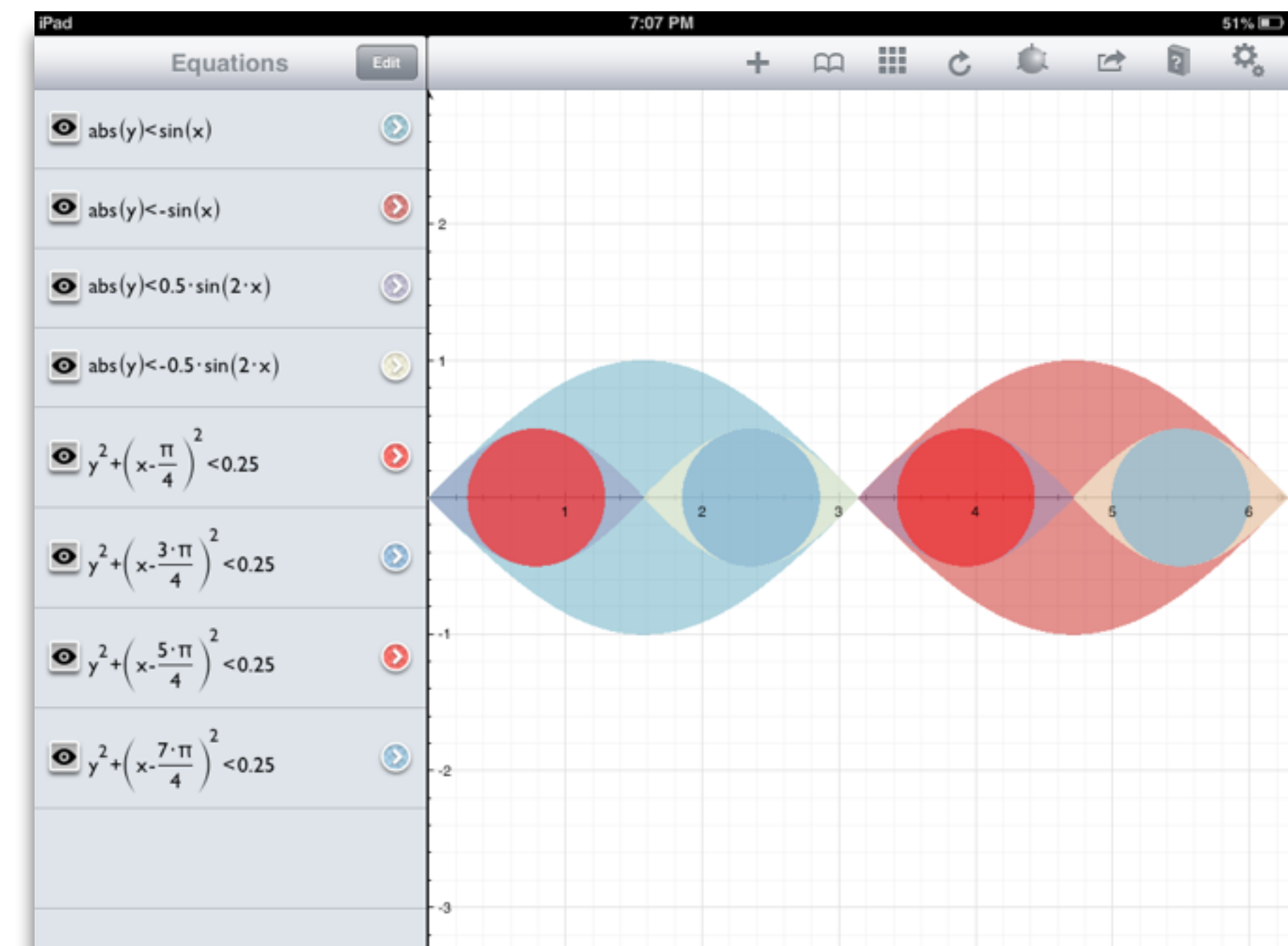
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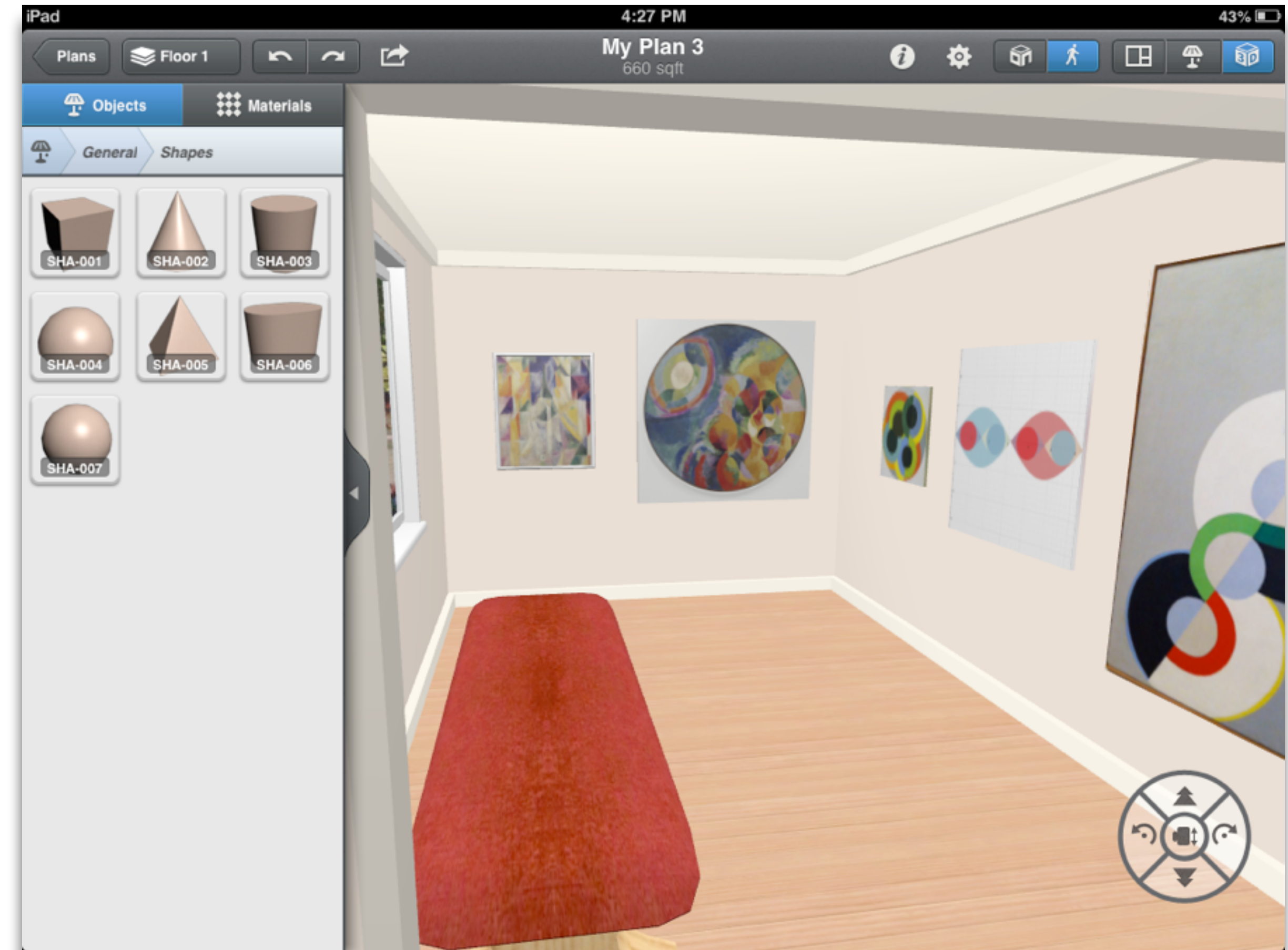
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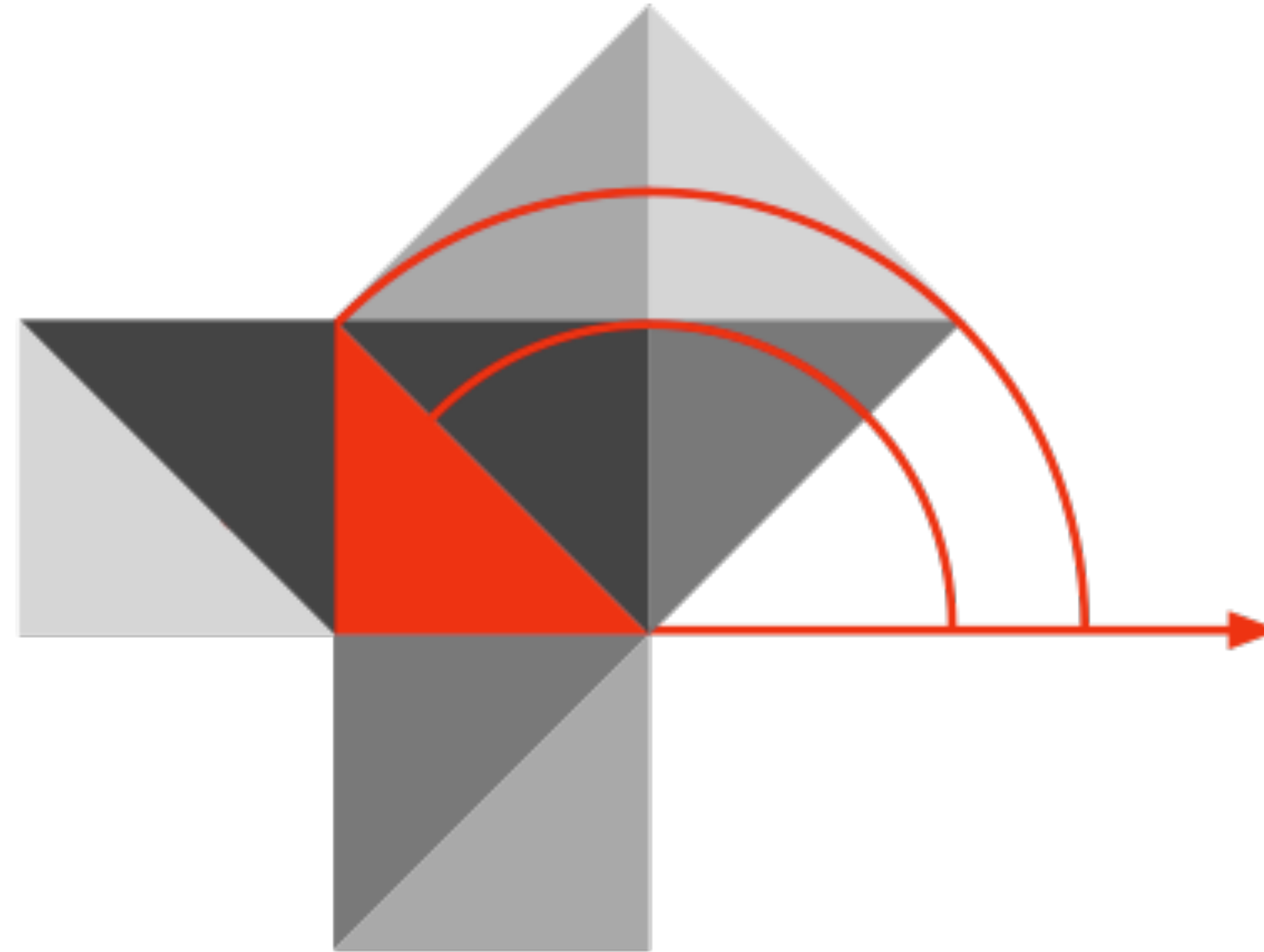
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# Hippasus

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Blog: <http://hippasus.com/blog/>

Email: [rubenrp@hippasus.com](mailto:rubenrp@hippasus.com)

Twitter: @rubenrp

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