Thinking About Games in Education

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Some Definitions

Formal Definition of **Game**

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

Salen, K. and E. Zimmerman, *Rules of Play : Game Design Fundamentals*. The MIT Press. (2003)

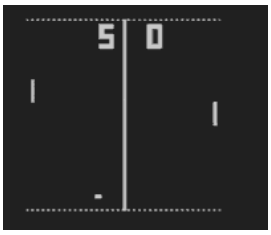
Games and Abstraction

- Some videogames are more like real-life simulations:

- Others are more abstract:

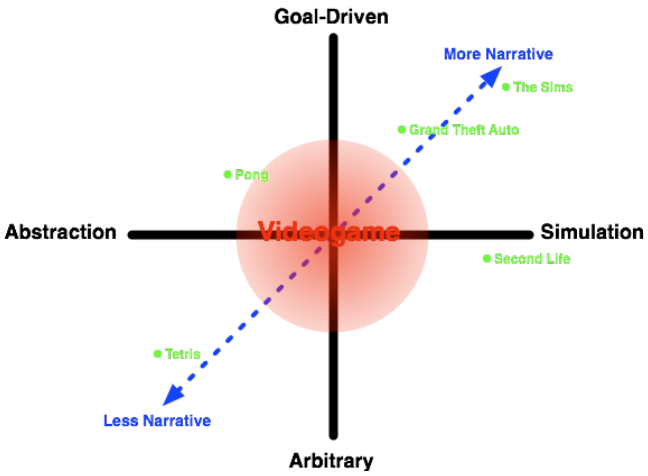
Games and Goals

- Some videogames are driven by real-life type goals:



- The goals in other games are more arbitrary:

Games and Narrative



R. Puentedura, "Playing Games in Education - or, *Thank You Mario… But Our Princess Is In Another University!*". *NMC Summer Conference*. (2005)

A Taxonomy of Genres

What Makes a Game Fun?

Games and Boredom

When Players Say…	…They Mean
The game is too easy	Game patterns are too simple
The game is too involved	Players are uninterested in the information required to detect patterns
The game is too hard	Patterns are perceived as noise
The game becomes too repetitive	New patterns are added too slowly
The game becomes too hard	New patterns are added too fast
The game runs out of options	All game patterns are exhausted

Raph Koster, Theory of Fun for Game Design. Paraglyph. (2004)

Successful Games

Include These Items…	…To Avoid
Preparation before challenges	Results due to pure chance
A sense of a game space	The perception of the game as trivial
A solid core mechanic	The game not being perceived as a game at all
A range of challenges	The game being exhausted too quickly
A range of required abilities	The game being perceived as simplistic
Skill in using the required abilities	The game being perceived as tedious

Three More Key Items for Success

You Need to Have…	…Because
Variable feedback	Players like to see greater skill result in greater rewards
A way to accommodate beginners and experts playing together	You don't want to see beginners get clobbered, and experts "bottom feed"
A definite cost for failure	Players feel cheated by "never-lose" games

Videogames and Learning

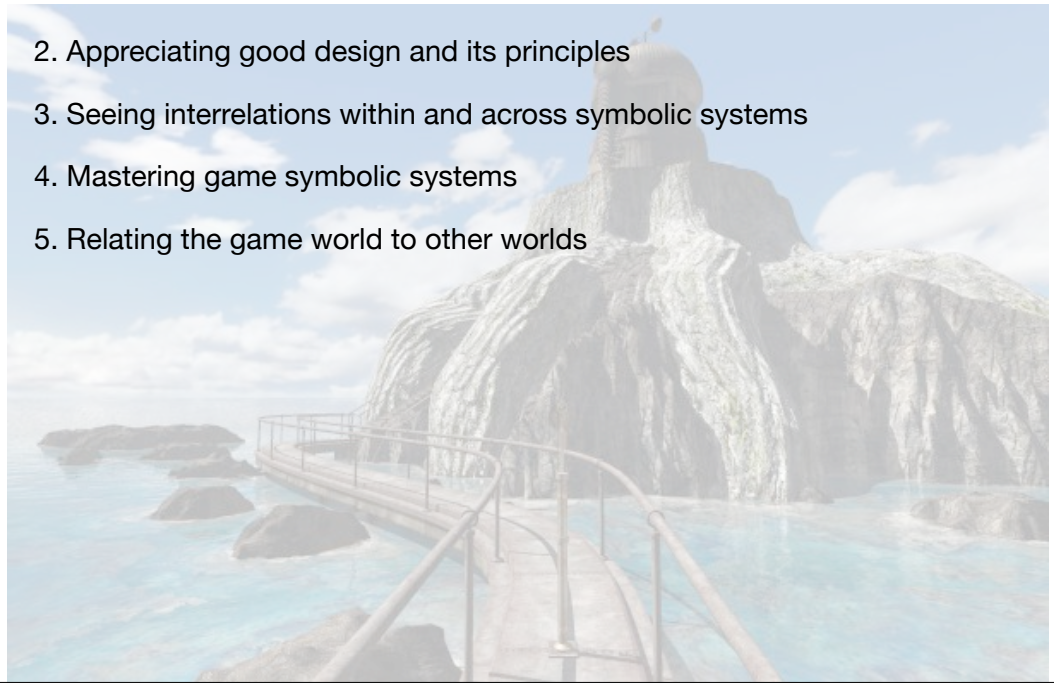
Active Learning

Gamers Learn From:

1. Doing and reflecting critically

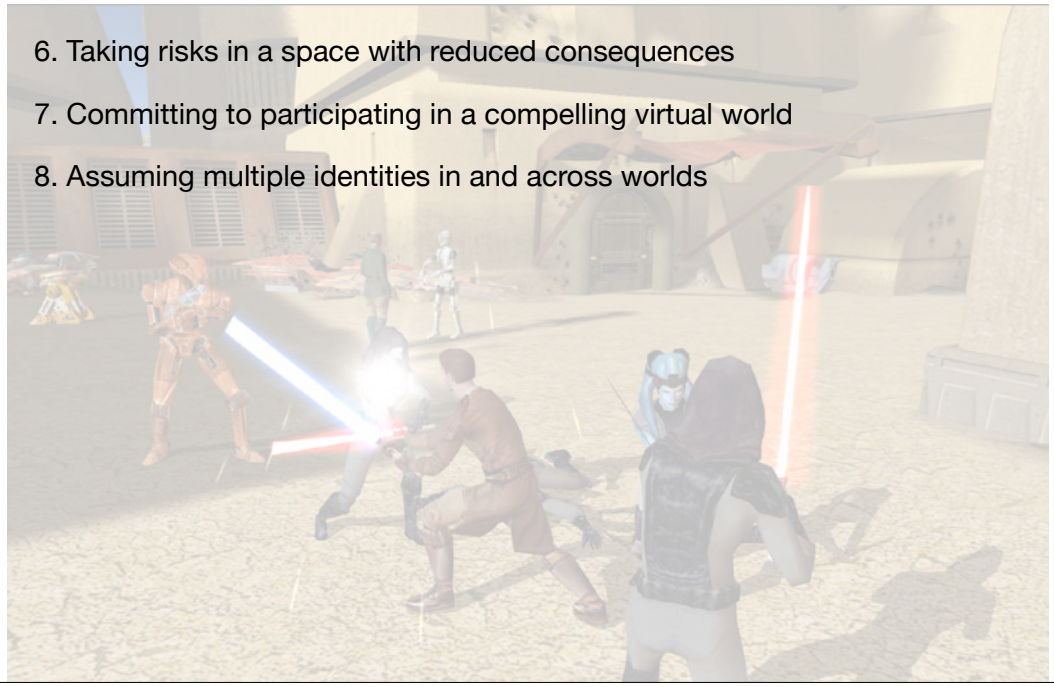
Gee, J.P., What Video Games Have to Teach Us About Learning and Literacy. Palgrave Macmillan. (2003)
Prensky, M. "Escape from Planet Jar-Gon Or, What Video Games Have to Teach Academics About Teaching and Writing." On The Horizon, Volume 11, No. 3 (2003)

Symbolic Systems



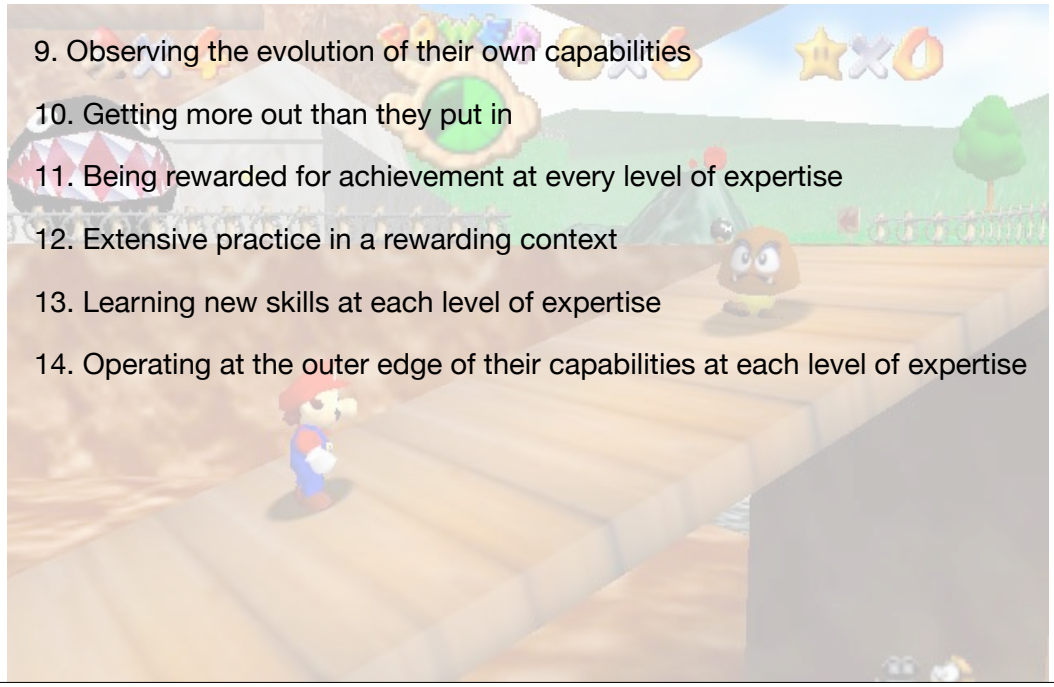
2. Appreciating good design and its principles
3. Seeing interrelations within and across symbolic systems
4. Mastering game symbolic systems
5. Relating the game world to other worlds

Worlds and Identities



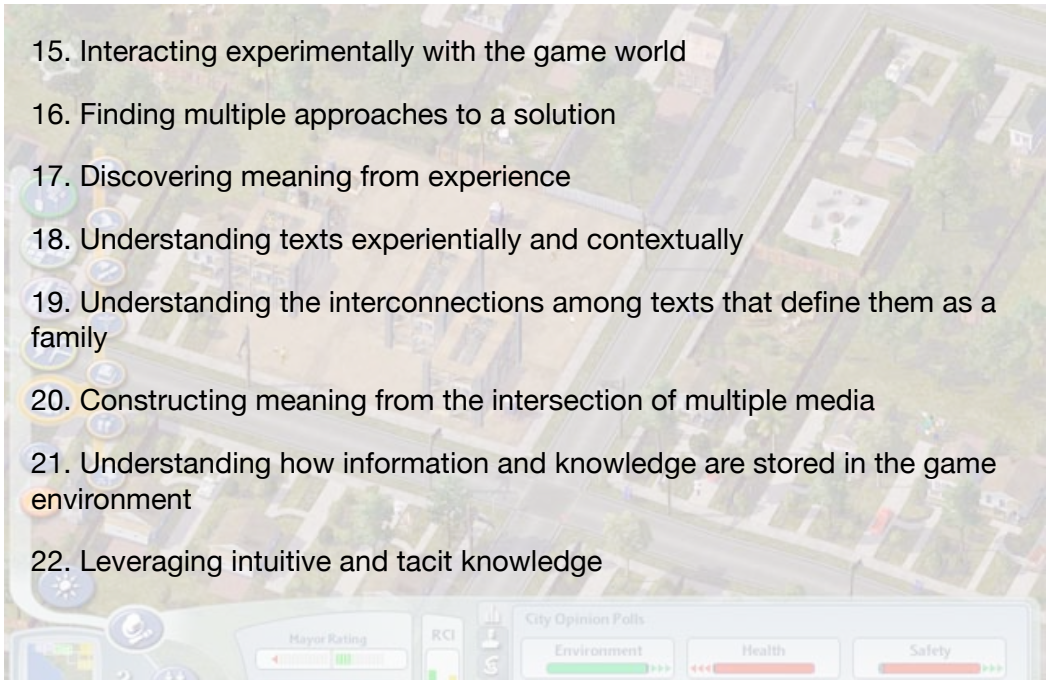
6. Taking risks in a space with reduced consequences
7. Committing to participating in a compelling virtual world
8. Assuming multiple identities in and across worlds

Development of Capabilities



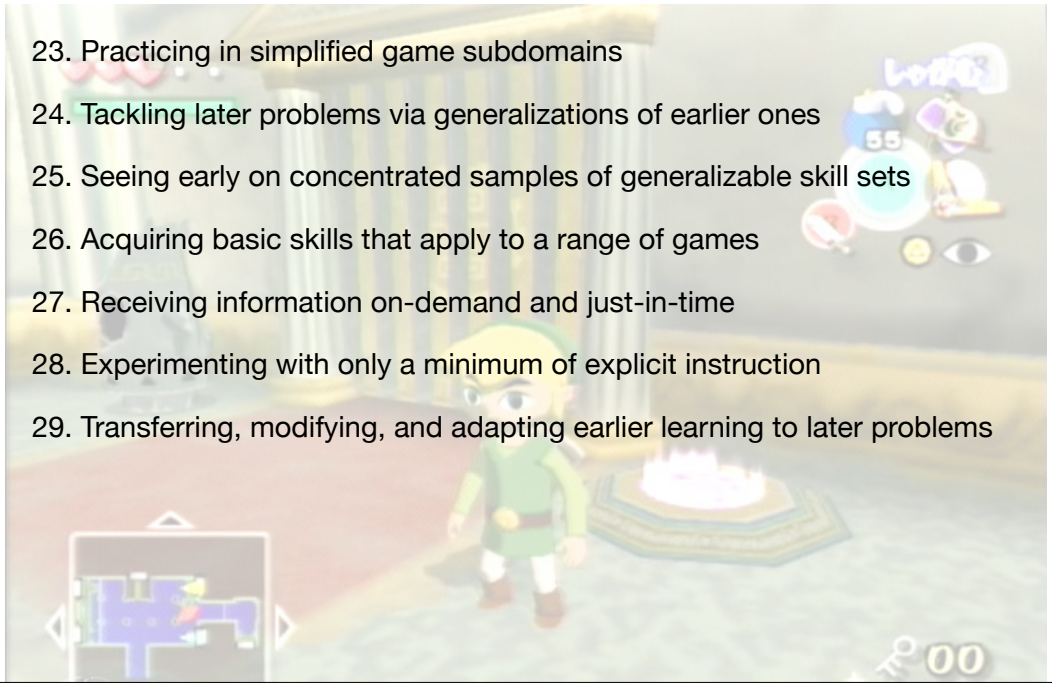
9. Observing the evolution of their own capabilities
10. Getting more out than they put in
11. Being rewarded for achievement at every level of expertise
12. Extensive practice in a rewarding context
13. Learning new skills at each level of expertise
14. Operating at the outer edge of their capabilities at each level of expertise

Experiential Learning



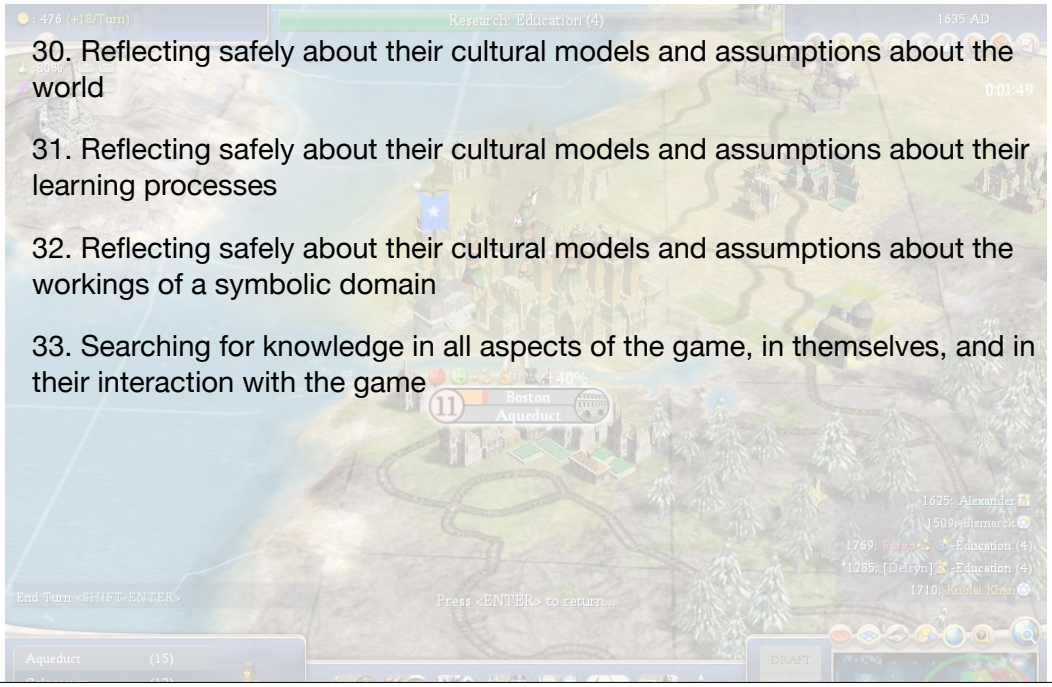
15. Interacting experimentally with the game world
16. Finding multiple approaches to a solution
17. Discovering meaning from experience
18. Understanding texts experientially and contextually
19. Understanding the interconnections among texts that define them as a family
20. Constructing meaning from the intersection of multiple media
21. Understanding how information and knowledge are stored in the game environment
22. Leveraging intuitive and tacit knowledge

Developing Skills



23. Practicing in simplified game subdomains
24. Tackling later problems via generalizations of earlier ones
25. Seeing early on concentrated samples of generalizable skill sets
26. Acquiring basic skills that apply to a range of games
27. Receiving information on-demand and just-in-time
28. Experimenting with only a minimum of explicit instruction
29. Transferring, modifying, and adapting earlier learning to later problems

Cultural Models



30. Reflecting safely about their cultural models and assumptions about the world
31. Reflecting safely about their cultural models and assumptions about their learning processes
32. Reflecting safely about their cultural models and assumptions about the workings of a symbolic domain
33. Searching for knowledge in all aspects of the game, in themselves, and in their interaction with the game

Community

34. Sharing their knowledge with other players
35. Forming a distinct community via shared interests in the gaming world
36. Teaching others and modifying the game experience

Notes From the Educational Research

Some Facts About Game Players

- The average videogame player is 35 years old
- 40% of all videogame players are women
- 69% of heads of households play videogames
- Among teens ages 12-17:
  - 97% play videogames (99% boys, 94% girls)
  - 80% play five or more different game types; 40% eight or more
  - 76% play games as a social activity:
    - 65% play with others in the same room; 27% online
  - Same-room game play relates positively to civic outcomes
  - Game-related social interaction relates positively to civic outcomes

Sources: Entertainment Software Association (http://www.theesa.com/facts/index.asp)
Pew/Internet Report: Teens, Video Games, and Civics (http://www.pewinternet.org/PPF/r/263/report_display.asp)

Effectiveness of Games in Education I

- Meta-study of 68 studies from 1963-1991
  - Social sciences; mathematics; language arts; logic; physics; biology
- Most effective: language arts and mathematics
  - 12 out of 14 studies showed positive results
- Next most effective: social sciences
  - 13 out of 46 showed positive results
  - 33 out of 46 were as effective as traditional methods
- Game learning overall showed better retention than traditional learning
- Students showed greater interest in topics taught via games or simulations

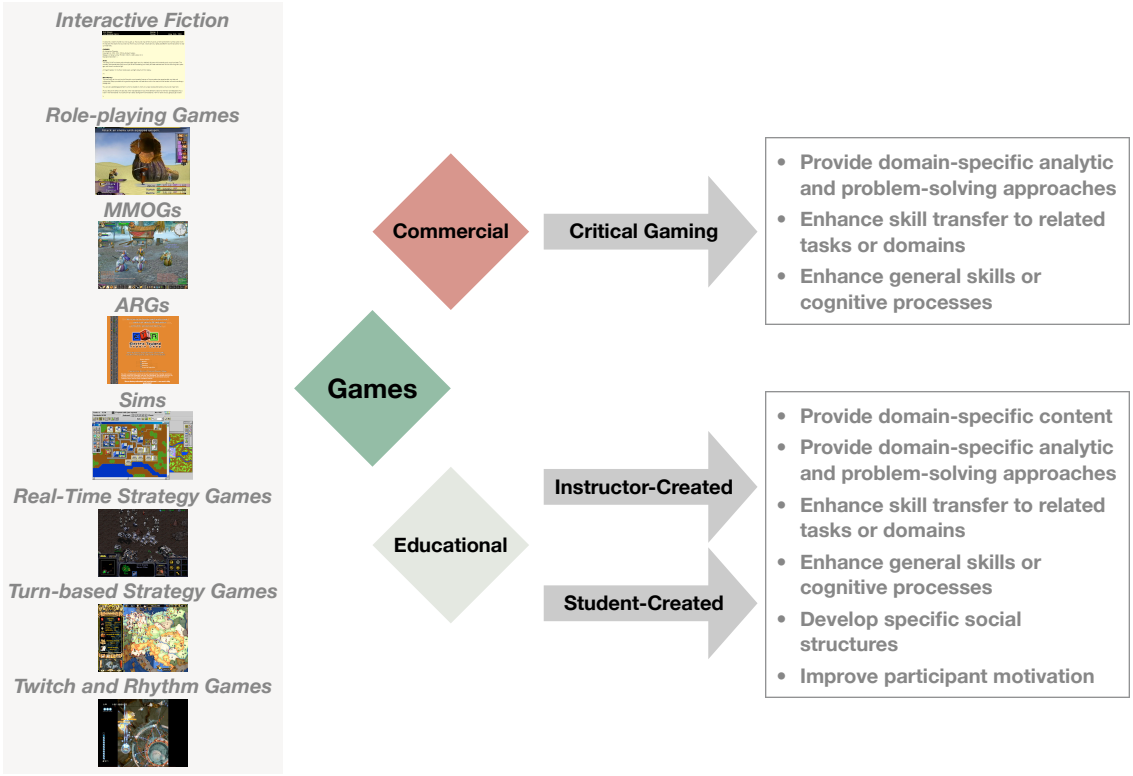
Randel, J.M., B.A. Morris, C.D. Wetzel, and B.V. Whitehill. "The Effectiveness of Games for Educational Purposes: A Review of Recent Research." Simulation & Gaming 1992 (Volume 23):261-276

Effectiveness of Games in Education II

- Review of research from 1992-2005
  - 42 papers directly related to use of games in instructional settings
- Topics:
  - Transfer to Real-Life Tasks: 5 positive, 1 neutral, 1 mixed
  - Facilitating Performance, Learning, and Transfer: 4 positive
  - Transfer to Related Tasks or Domains: 8 positive, 1 neutral
  - Effects on Different Variables: 5 positive
  - Effects on Cognitive Processes: 9 positive
  - Team Characteristics of Game Players: 1 positive, 2 mixed
  - Motivational Effects: 3 positive, 2 mixed

Fletcher, J.D. and S. Tobias. "Using Computer Games and Simulations for Instruction: A Research Review." Proceedings of the Society for Advanced Learning Technology Meeting (February 2006)

Critical Gaming



R. Puentedura, "I Taught It, Bought It at the Game Store: Repurposing Commercial Games for Education". *NMC Summer Conference Proceedings*. (2007) Online at: http://www.nmc.org/publications/2007-conference-proceedings

Four Questions

1. Why are you doing what you're doing to beat the game?
2. What aspects of the game lead you to that approach?
3. Where are you taking risks, and where are you playing it safe?
4. What skills do you need to develop to get better at this game?

Key Elements of Critical Gaming

- Establish what the game is attempting to represent
- Establish how it's doing it
- Determine its successes
- Determine its shortcomings and their sources:
  - Technical limits
  - Game fun limits
  - Conceptual limits
- Propose remedies for the shortcomings
- Propose ways to further investigate the game

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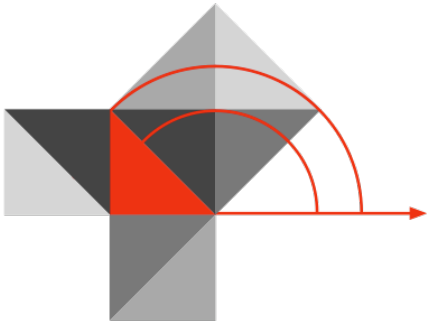

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