Game Design and Musical Interactivity

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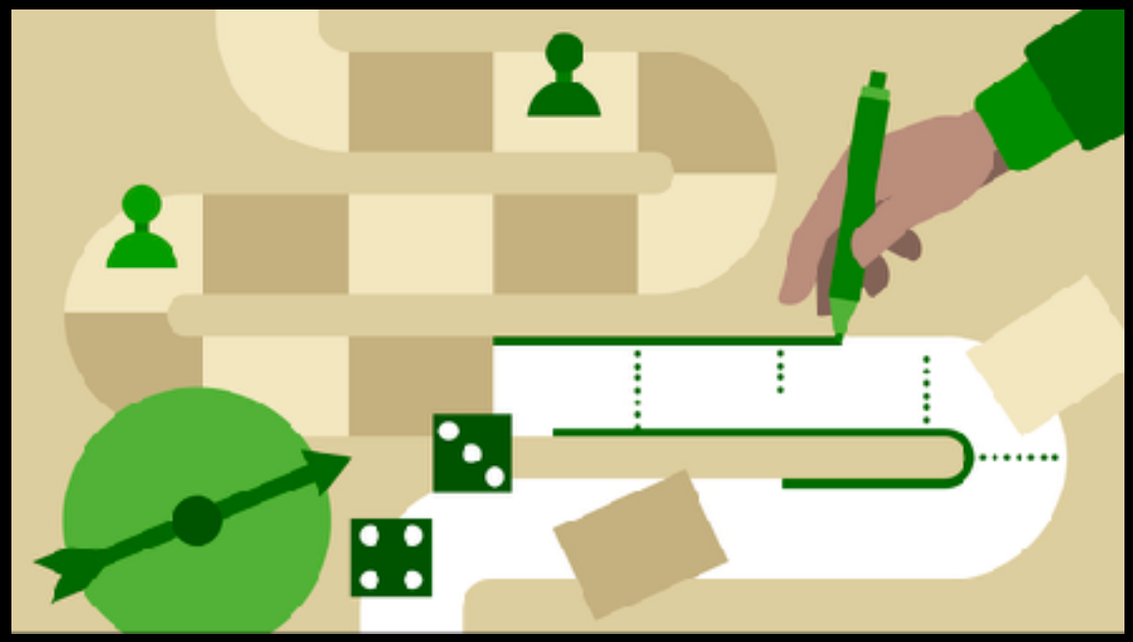
Elements of Game Design



Elements of Game Design

- "Game design is the process of creating the **content** and **rules** of a game" (*Challenges for Game Designers*, p2)

- "The game designer envisions how a game will work during play. She creates the **objectives**, **rules**, and **procedures**, thinks up the **dramatic premise** and gives it life, and is responsible for planning everything necessary to create a compelling **player experience**." (*Game Design Workshop,* p2)

Elements of Game Design

- **Formal elements**
  - Form the structure of a game
  - Players, Objective, Procedures, Rules, Conflict, Boundaries, Outcome
- **Dramatic elements**
  - Engage players emotionally
  - Challenge, Play, Premise, Character, Story

Formal Elements

Formal Elements

- **Tic-Tac-Toe:**
  - 3x3 grid
  - 2 players, X and O
  - Alternate turns placing X/O on grid
  - First 3-in-a-row wins

O	**X**	O
X	**X**	O
O	**X**	X

Formal Elements

- **Activity:** Play a game of tic-tac-toe.

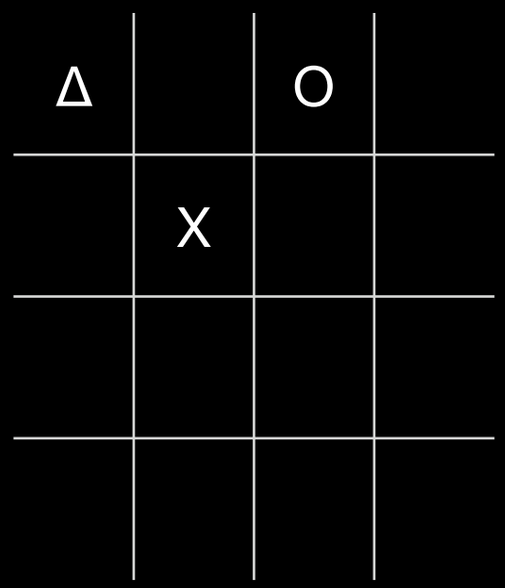
O	**X**	O
X	**X**	O
O	**X**	X

Formal Elements

- **Players** = 2 players, player vs. player
- **Objective** = to obtain three in a row
- **Procedures** = placing an X or O
- **Rules** = alternate turns; cannot place X/O on occupied space
- **Conflict** = opponents, attack/defense
- **Boundaries** = the game board, start/end of game
- **Outcome** = zero-sum

Formal Elements

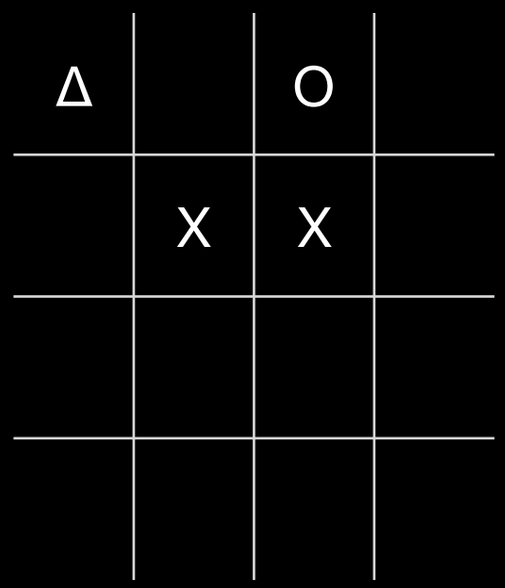
- **Activity:** Play a modified version of tic-tac-toe for **3 players** (X, O, Δ) and a **4x4 grid boundary**



Formal Elements

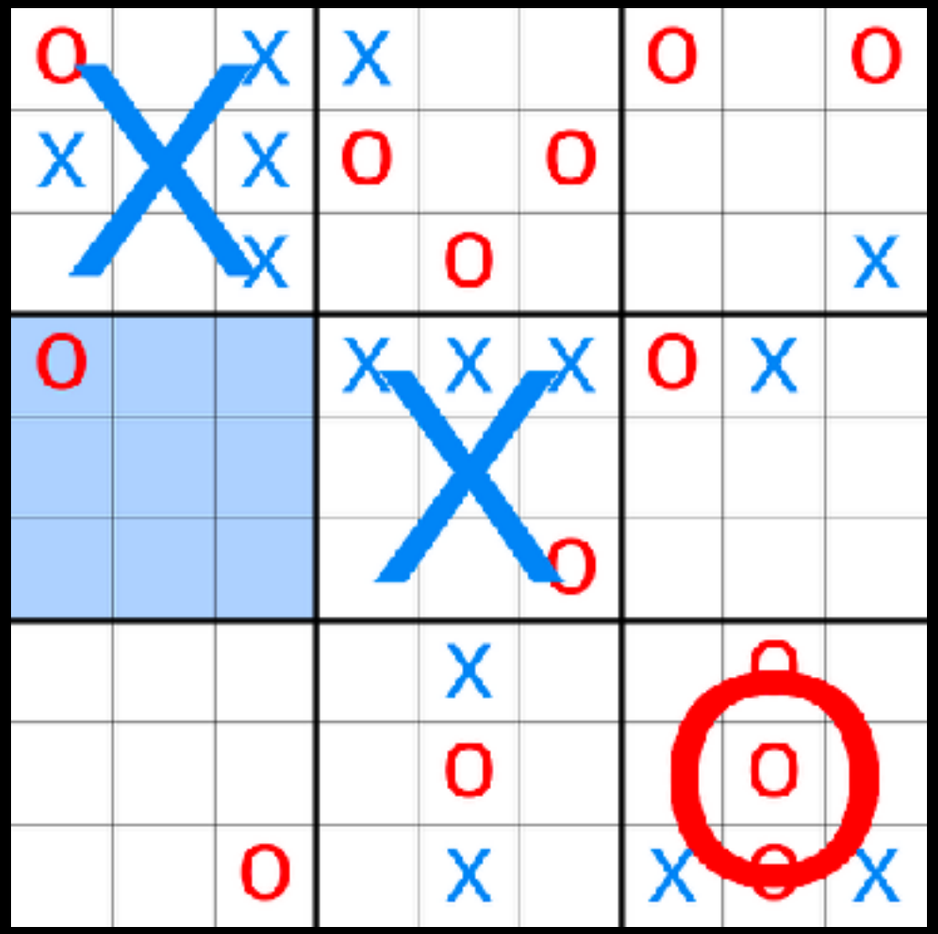
- **Activity:** Play a modified version of tic-tac-toe for **3 players** (X, O, Δ) and a **4x4 grid boundary**

  - How did it affect the gameplay?

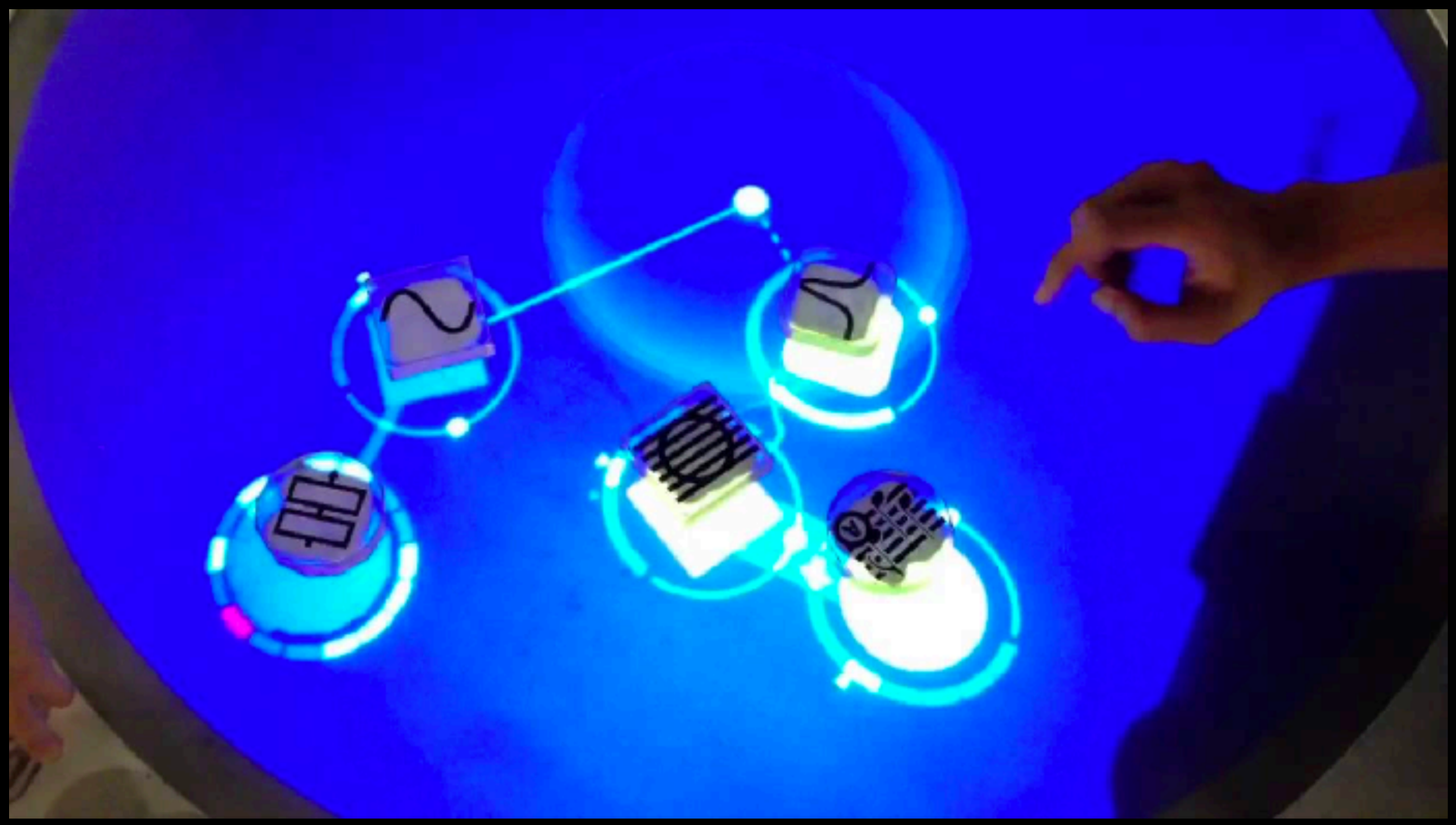


Formal Elements

- **Example:** Ultimate Tic-Tac-Toe



Musical Interactivity



Musical Interactivity

- "Interactive usually means the audience has to 'interact' with the piece for it to be 'active'." (Carey Dodge)
- "A truly interactive musical piece must be such that without interaction, it cannot come into being." (Jean-Marc Pelletier)

Musical Interactivity

- Video games (*Frogger*, *Guitar Hero*)

(1981)

(2005)

Musical Interactivity

- Live performances (Imogen Heap's Mi.Mu gloves)

(2004)

Musical Interactivity

- **Activity:** Play "musical sound effects" version of tic-tac-toe.
    - Each time a player places an X/O, a musical chord is played
    - The **notes** in the chord and **timbre** of the instrument are different for X and O
        - **X**: notes = C+E, timbre = dull
        - **O**: notes = E+G, timbre = bright

Adaptive Music

Adaptive Music

- "An adaptive soundtrack constantly **changes dynamically** by reacting to some type of control **input** coming from the game." (Melodrive)

Adaptive Music

- **Activity:** Play adaptive music version of tic-tac-toe.
    - **Foreground layer** = sound effects (same as before)
    - **Background layer** = new, adaptive
        - notes = alternates between {C+G} and {C+F} each time an X/O is placed
        - timbre = thicker

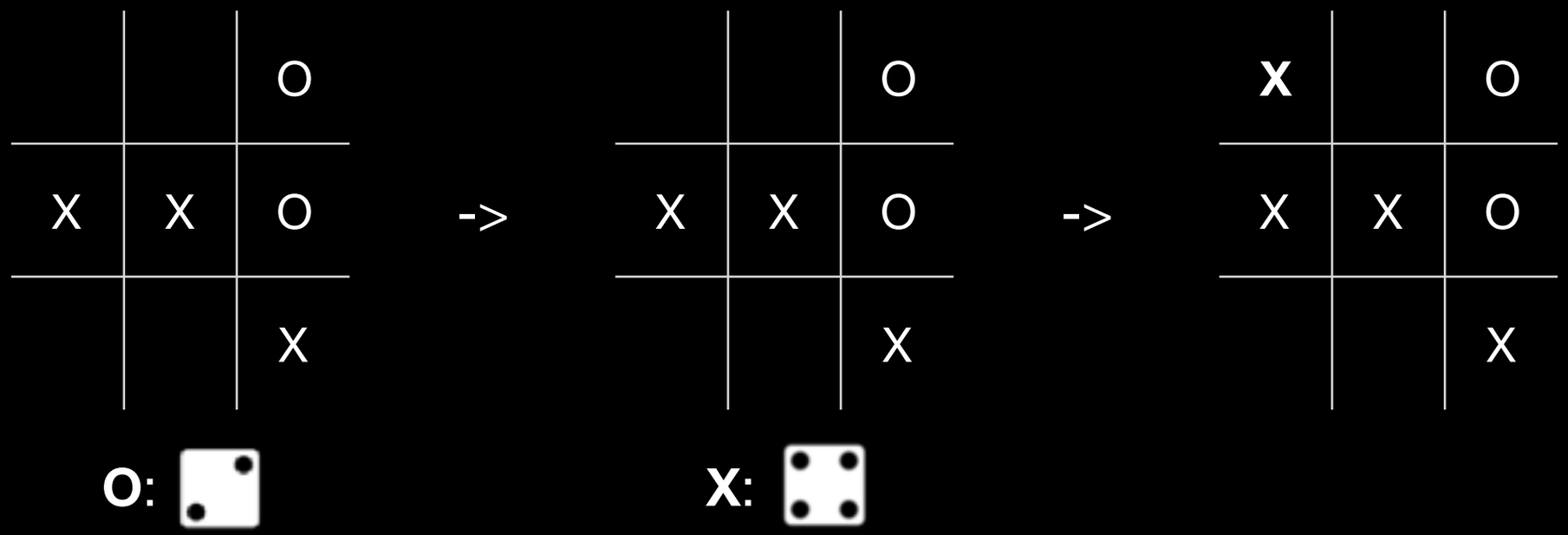
Randomness in Games

Randomness in Games

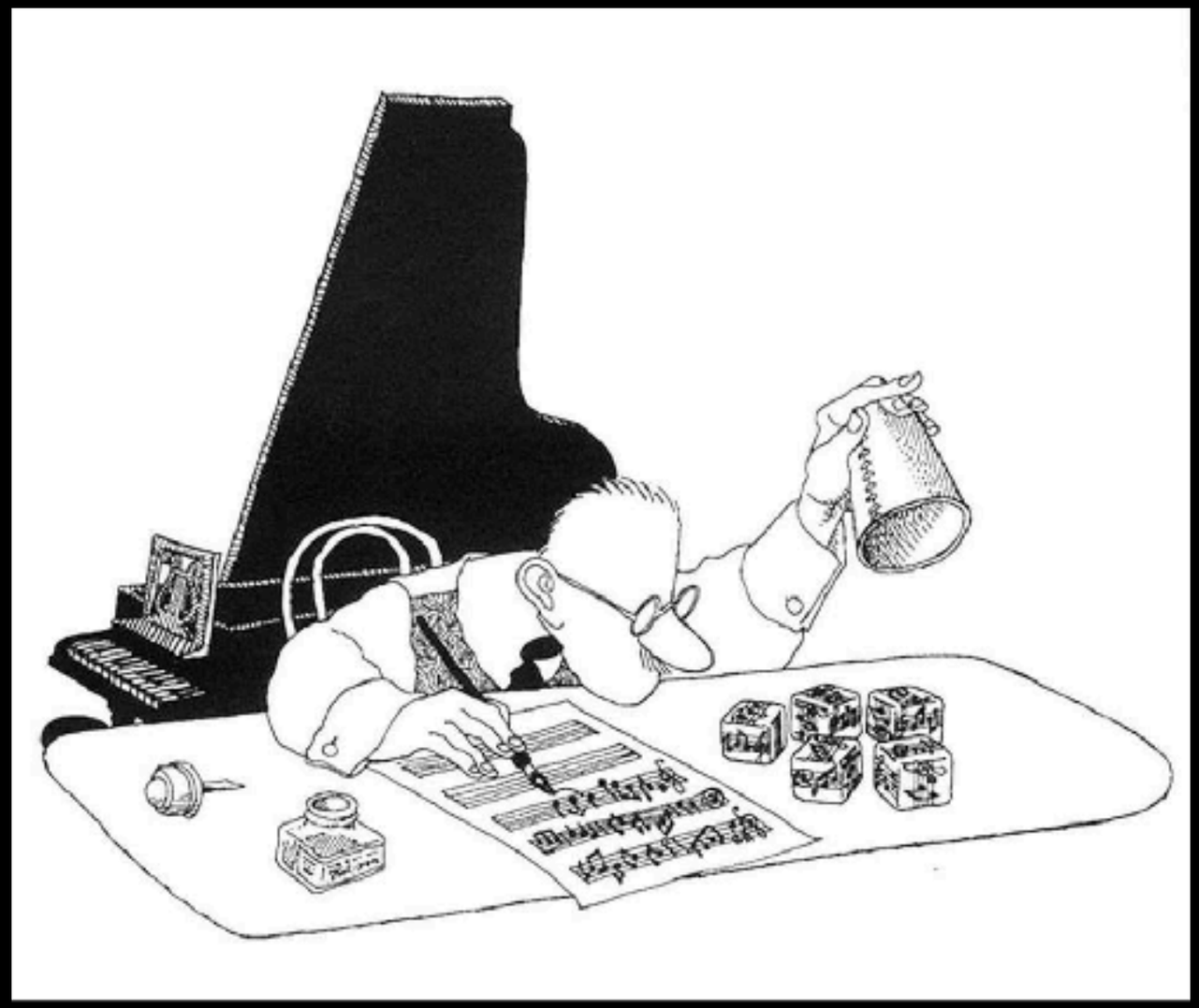
- Why add randomness and chance to games? (*Challenges for Game Designers* p71)
    - Delaying or preventing solvability
    - Balancing play between skill levels
    - Increasing variety
    - Creating dramatic moments
    - Enhancing decision making

Randomness in Games

- **Activity:** Play a game of tic-tac-toe, but with the following rule modification:
    - On your turn, you must now **roll a die**.
        - If the resulting number is **4 or greater**, you can place your X/O down
        - If the resulting number is **3 or lower**, you skip your turn :(



Aleatoric Music

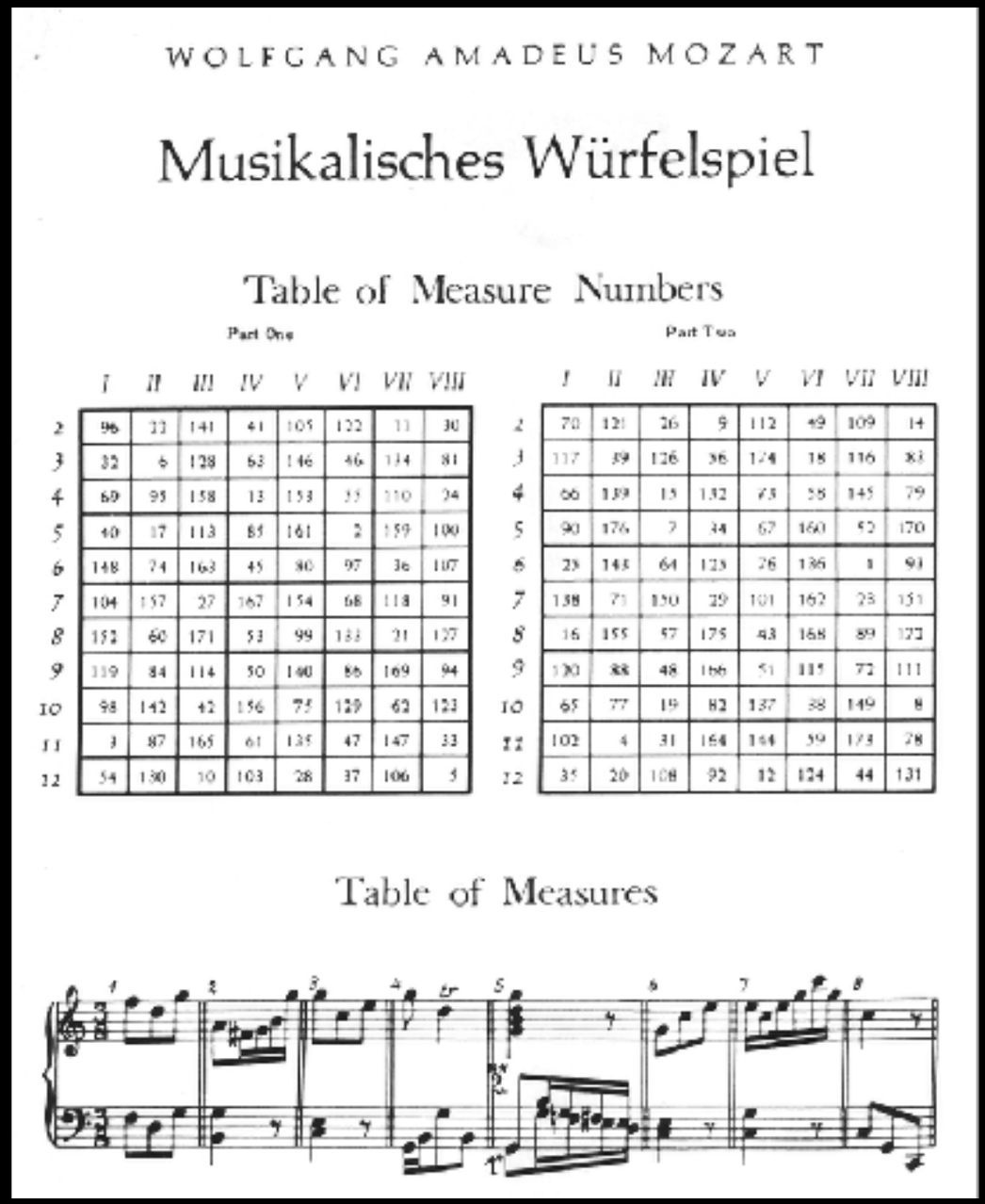


Aleatoric Music

- Also known as **chance music**
- A form of **algorithmic composition**
  - Algorithm = "a step-by-step procedure for solving a problem or accomplishing some end" (Merriam-Webster)

Aleatoric Music

- Musikalisches Würfelspiel
  - "Musical dice game" in German
  - Mozart K. 516f (1787)
  - Can produce 11^{16} = 45,949,729,863,572,161 different waltzes



WOLFGANG AMADEUS MOZART

Musikalisches Würfelspiel

Table of Measure Numbers

Part One

	I	II	III	IV	V	VI	VII	VIII
2	96	22	141	41	105	122	11	30
3	32	6	128	63	146	46	134	81
4	69	95	158	13	153	55	110	24
5	40	17	113	85	161	2	159	100
6	148	74	163	45	80	97	36	107
7	104	157	27	167	154	68	118	91
8	152	60	171	53	99	133	21	127
9	119	84	114	50	140	86	169	94
10	98	142	42	156	75	129	62	123
11	3	87	165	61	135	47	147	33
12	54	130	10	103	28	37	106	5

Part Two

	I	II	III	IV	V	VI	VII	VIII
2	70	121	26	9	112	49	109	14
3	117	39	126	56	174	18	116	83
4	66	139	15	132	73	58	145	79
5	90	176	7	34	67	160	52	170
6	25	143	64	125	76	136	1	93
7	138	71	150	29	101	162	23	151
8	16	155	57	175	43	168	89	172
9	120	88	48	166	51	115	72	111
10	65	77	19	82	137	38	149	8
11	102	4	31	164	144	59	173	78
12	35	20	108	92	12	124	44	131

Table of Measures

Aleatoric Music

- Rolling dice using a computer
  - `Math.floor(Math.random()*6)`

Aleatoric Music

- **Activity:** Play aleatoric music version of tic-tac-toe.
    - Same **foreground** (sound effects) and **background** (adaptive) layers
- Each time an X/O is placed:
    - Computer chooses **4 random notes** from the C major scale
    - **Foreground** layer plays those 4 notes as a chord
    - **Background** layer randomly plays 1 of those notes on every beat

Additional Resources

- **Game design**
  - *Game Design Workshop* by Tracy Fullerton
  - *Challenges for Game Designers* by Brenda Brathwaite and Ian Schreiber
  - Extra Credits (YouTube channel)

Additional Resources

- **Musical interactivity**
  - *Interactive Music Systems* by Robert Rowe
  - *A Composer's Guide to Game Music* by Winnifred Philips

Additional Resources

- **Coding/programming**
  - Codecademy (free coding courses)
  - p5.js (JavaScript library for creative coding)
  - Tone.js (framework for creating interactive music in the browser)

Thank you!

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