EVALUATION OF PLAYFULNESS FOLLOWING ENGAGEMENT IN VIRTUAL REALITY

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Perspectives on Play

- As occupation (Reilly, 1974; Vanderberg & Kielhofner, 1982)

- internal locus of control (Rubin et al, 1983)

- theories of purpose of play, role in development, role on self-esteem, context of play (Parham & Primeau, 1997)

Playfulness

- **1. Intrinsic motivation**
- **2. Internal control**
- **3. Freedom to suspend reality**
- **4. framing**

Intrinsic motivation

- Refers to some aspect of the activity itself, rather than to an external reward, that provides the impetus for the individual's involvement in the activity

Internal control

- **Suggests the individual is largely "in charge" of his actions and at least some aspects of the activity's outcome**

Freedom to suspend reality

- **Means that the individual chooses how close to objective reality the transaction will be**

Framing

- **Refers to the ability to give and receive social cues to maintain the play frame**

Hypothesis

VR play is fun and engaging

↓

Increased motivation

↓

Increased self control

↓

Increased satisfaction

↓

Playfulness

Research questions

- 1. What is the level of playfulness among children with cerebral palsy engaged in virtual play?

- 2. How does playfulness change according to different contexts?

- 3. What are the features of the VR games and their relation to different levels of playfulness?

Participants

- 13 eight to twelve year olds (mean age = 10 yrs, 5 mo.)
- 7 male, 6 female
- 7 wheelchair users
- able to reach with at least one arm

Procedures

- **8 one-hour sessions**
- **children sat in demarcated area in front of large TV screen**
- **television was interfaced with VR system**
- **children could see themselves on the TV**

Procedures (cont.)

- **Each session started with the application "Birds and Balls"**
- **other games were played throughout the session**

VR system

- **Mandela Gesture Xtreme VR system**

- **tracking device**

- **user moves and interacts with virtual environment**

Instrument

- **Test of Playfulness (Bundy, 1997)**
- **24 items**
- **scored on 4-point extent scale, intensity scale, and skill scale**
- **a rating of 3 indicates a good or high rating and a rating of 0 indicates a low or poor rating**

Modifications to instrument

- Four of the items were non-applicable to the context of VR
- 1. Appears safe
- 2. Actively modifies complexity and/or demands of the activity
- 3. Plays interactively with others
- 4. Enters a group already engaged

Subscales

- **The items were grouped into 4 subscales (factors) according to Bundy**

- **5 items = motivation subscale**

- **7 items = internal control subscale**

- **5 items = suspension of reality subscale**

- **3 items = framing subscale**

Data analysis

- **8 VR sessions videotaped**
- **3 sessions were randomly selected and 3 trials (applications) were scored**
- **total of 117 trials analysed**

Results

- **The number of times an application was played varied depending on what the child chose to play**

Table 1. Frequency of VR environments played by participants

VR Environment	Times Played	N
Birds and balls	23	12
City (flying space ship)	3	3
Island sound (musical instruments)	4	3
Paint	9	6
Snowboarding	16	11
Soccer	10	6
Speedroller (driving car)	11	8
Trip (shape maker)	7	7
Volleyball	19	11
Shark (swimming game)	8	7
Drums	1	1
Gravball (ball game into hoops)	6	6

Results

- **Overall means and SD were calculated for each of the 4 subscales**

Table 2. Means and standard deviations for subscale scores (N = 13).

EXTENT				INTENSITY				SKILL			
M	C	S	F	M	C	S	F	M	C	S	F
1.86	1.59	0.12	1.54	1.96	1.67	1.93	0.0	0.0	2.25	1.77	2.13
0.77	1.05	0.41	0.79	0.49	0.63	0.46	0.0	0.0	0.79	0.51	0.46

Key: M = motivation, C = control, S = suspension, F = framing

Results

- **Motivation score ranged from 1.50-2.25**

- **control score from 1.00-1.88**

- **suspension score from 0-.26**

- **framing score from 1.33-1.78**

Table 3. Means and standard deviations for playfulness ratings across VR environments

VR GAME	M	C	S	F
Paint	2.06	1.79	0.11	1.62
Soccer	1.79	1.33	0.06	1.41
Shark	1.77	1.46	0.10	1.48
Drums	1.50	1.00	0.0	1.50
Volleyball	1.91	1.73	0.15	1.53
Birds & Balls	1.67	1.37	0.09	1.48
Trip	2.25	1.70	0.26	1.42
Snowboarding	1.94	1.58	0.10	1.61
City	1.83	1.78	0.0	1.78
Speedroller	1.81	1.88	0.09	1.63
Gravball	1.50	1.50	0.07	1.72
Island Sounds	2.13	1.67	0.50	1.33

Key: M = Motivation, C = Internal Control, S = Suspension from Reality, F = Framing

Results

- The motivation subscale mean was the highest for both extent and intensity ratings

- The internal control subsacle mean was the highest for skill ratings

- three VR environments yielded extant ratings of 2 or "much of the time" (Trip, Paint, Island Sounds)

Results

- All bahaviours were demonstrated 10% 10 90 % of the time for all ratings except for suspension of reality

- seven other games ranged in ratings from 1.33 to 1.88 reflecting the behaviour was demonstrated some of the time.

Discussion

- **Children did exhibit playfulness according to the elements of motivation, internal control, and framing that conceptualise the construct of playfulness in the TOP**

Discussion

- **Motivation - Participants appeared to actively engaged**
- **they persisted and repeated their actions to succeed**
- **they were exuberant, laughing and shouting**
- **they were concentrating hard therefore did not manifest joy**

Discussion

- **Internal control - Participants engaged in challenging behaviours**

- **they shared the task requirements and played well with a partner**

- **they let their desires known for changes to the game**

Discussion

- Suspension of reality - hard to rate this element

- participants did not pretend except for a few comments " I am a pilot"

- They did make jokes and teased staff

Discussion

- **Framing - Participants were skilled at showing they were able to give and respond to other's cues**

- **The opportunity to give and receive facial and body cues was restricted due to the nature of VR**

Discussion

- The games of Trip, Island sounds, Paint encouraged participants to remain engaged
- There was an element of creativity with each of these
- Entexturement seen here

Discussion

- **Drums and gravball produced the lowest ratings**
- **they were frustrating because of a reaction delay to user's movements and the unpredictability of the game**
- **They felt not in control of these games**

Discussion

- **The other seven games produced similar levels of playfulness**

- **Volleyball, snowboarding were two-player games which resulted in playing with others and assuming leadership roles**

- **also element of pretend here**

Summary

- **TOP was useful in measuring playfulness in children who engage in VR play**

- **Knowing which environments are conducive to playfulness is helpful**

- **Designing new environments with elements to enhance M, C, S, F is a recommendation for future R & D**