

Perceived Exertion (RPE), Comfort, and Control Assessment

As you become more familiar with your body's reactions during exercise, you'll learn to recognize when it's time to change how hard you work. For instance, consider a walker aiming for **moderate-intensity exercise**. Their target would be to hit a **"somewhat hard"** level, corresponding to **12-14 on the Borg Scale**. Should they find their effort registering as **"very light"** (a **9 on the Borg Scale**), this is an indicator to ramp up your pace. Conversely, if the walker experiences his or her effort as **"extremely hard"** (ranking at **19 on the Borg Scale**), it's a sign to reduce the intensity, slowing down to stay within the moderate-intensity zone.

Rating of Perceived Exertion

- 6 - No exertion, sitting and resting
- 7 - Very, very light
- 8 - Very, very light
- 9 - Very light
- 10 - Very light
- 11 - Fairly light
- 12 - Somewhat hard
- 13 - Somewhat hard
- 14 - Somewhat hard
- 15 - Hard
- 16 - Very hard
- 17 - Very hard
- 18 - Very, very hard
- 19 - Extremely hard
- 20 - Maximum exertion (Borg, 1998)

1. Scoop Shovel

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Shovel Use

Participant Information:

Participant ID:

Shovel Types (A, B, C, D, E, F, G, H, I, J, K, L, M, N.....):

Task Description: Scoop up wood pellets and transfer them to a wheelbarrow.

Comfort Evaluation for Scoop Shovel:

1. On a scale from 1 to 5, rate the overall comfort of using the shovel (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

(Rating Shovel 1 2 Shovel 2 2 Shovel 3 2).



- Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Shovel 1 left forearm
 Shovel 2 left forearm
 Shovel 3 left forearm + back

- Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Shovel 1 design
 Shovel 2 design of the attachment is
 Shovel 3 design

- Suggest improvements for the shovel's comfort.

Shovel 1 the attachment made it a little difficult to dump
 Shovel 2 the attachment is bulky and puts more pressure on left arm
 Shovel 3 attachment puts more pressure on left arm

Worksheet 2: Control and Perceived Exertion Assessment for Shovel Use

Control Evaluation:

- On a scale from 1 to 5, rate your perceived level of control while using the shovel (**1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all**).

1. (Rating Shovel 1 1 Shovel 2 1 Shovel 3 1).

- Discuss the shovel's ability to maintain control over the load.

Shovel 1 it did a really good job - the bucket was a little shallow
 Shovel 2 did a really good job with the load
 Shovel 3 good job with load - the bucket slits made it a little difficult

- Identify any design aspects of the shovel that hindered control.

Shovel 1 shallow bucket
 Shovel 2 none
 Shovel 3 no slits in bucket

- Recommend enhancements for better control.

Shovel 1 deeper bucket
 Shovel 2 the control was great



Shovel 3 control was overall good

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the Borg RPE scale (6-20), rate your perceived exertion.

(Rating Rating Shovel 1 10 Shovel 2 10 Shovel 3 10).



2. Pitchfork

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Pitchfork Use

Pitchfork Type (A, B, C, D, E, F, G, H, I, J, K, L, M.....):

Task Description: Removing straw mixed with dung and transferring them to a wheelbarrow.

Comfort Evaluation for Pitchfork:

6. On a scale from 1 to 5, rate the overall comfort of using the pitchfork (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

1. (Rating Pitchfork 1 3 Pitchfork 2 2 Pitchfork 3 3).

2 Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Pitchfork 1 wrists, back

Pitchfork 2 ~~back~~ left arm

Pitchfork 3 left arm

3 Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Pitchfork 1 design - it was heavy

Pitchfork 2 attachment put more pressure on left arm

Pitchfork 3 attachment made it difficult to dump

4 Suggest improvements for the shovel's comfort.

Pitchfork 1 lighter material

Pitchfork 2 smaller attachment

Pitchfork 3 smaller attachment



Worksheet 2: Control and Perceived Exertion Assessment for Pitchfork Use

Control Evaluation:

7. On a scale from 1 to 5, rate your perceived level of control while using the (1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all).

1 (Rating Pitchfork 1 2 Pitchfork 2 2 Pitchfork 3 2).

2 Discuss the shovel's ability to maintain control over the load.

Pitchfork 1 good job maintaining control

Pitchfork 2 good job maintaining control

Pitchfork 3 good job maintaining control

3 Identify any design aspects of the shovel that hindered control. ✓

Pitchfork 1 the attachment made it easier to dump & scoop

Pitchfork 2 attachment made it easier to scoop

Pitchfork 3 attachment made it easier to scoop but harder to dump

4 Recommend enhancements for better control.

Pitchfork 1 shorter handle

Pitchfork 2 _____

Pitchfork 3 smaller attachment

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the **Borg RPE scale (6-20)**, rate your perceived exertion for pitchforks.

(Rating Pitchfork 1 12 Pitchfork 2 9 Pitchfork 3 9).

General Instructions:

Participants should complete these assessments after using each tool type for the designated tasks. Feedback should be detailed, focusing on ergonomic efficiency, cardiovascular effort, and perceived exertion to guide recommendations for design improvements. This approach ensures that the assessment captures not only



the subjective and physical aspects of using the tools but also the cardiovascular impact, providing a comprehensive understanding of their ergonomic efficiency.

C

1st day

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As you become more familiar with your body's reactions during exercise, you'll learn to recognize when it's time to change how hard you work. For instance, consider a walker aiming for **moderate-intensity exercise**. Their target would be to hit a **"somewhat hard"** level, corresponding to **12-14 on the Borg Scale**. Should they find their effort registering as **"very light"** (a **9 on the Borg Scale**), this is an indicator to ramp up your pace. Conversely, if the walker experiences his or her effort as **"extremely hard"** (ranking at **19 on the Borg Scale**), it's a sign to reduce the intensity, slowing down to stay within the moderate-intensity zone.

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2 X puthe
 1 w ped
 3 u white

1. Scoop Shovel

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Shovel Use

Participant Information:

Participant ID:

Shovel Types (A, B, C, D, E, F, G, H, I, J, K, L, M, N.....):

Task Description: Scoop up wood pellets and transfer them to a wheelbarrow.

Comfort Evaluation for Scoop Shovel:

1. On a scale from 1 to 5, rate the overall comfort of using the shovel (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

(Rating Shovel 1 3 Shovel 2 4 Shovel 3 2).

2. Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body)
Please describe.

Shovel 1 fore arms + upper back
Shovel 2 lower back + arms
Shovel 3 Middle back

3. Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Shovel 1 grip + design
Shovel 2 longer handle to prevent bending over grip + design
Shovel 3 grip

4. Suggest improvements for the shovel's comfort.

Shovel 1 softer grip point
Shovel 2 longer handle or softer grip
Shovel 3 No slits in the bucket

Worksheet 2: Control and Perceived Exertion Assessment for Shovel Use

Control Evaluation:

5. On a scale from 1 to 5, rate your perceived level of control while using the shovel (1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all).

1. (Rating Shovel 1 3 Shovel 2 2 Shovel 3 4).

2. Discuss the shovel's ability to maintain control over the load.

Shovel 1 it was fairly small + did not hold a lot
Shovel 2 the bucket was large to get a large load
Shovel 3 the bucket made it hard to keep shavings in

3. Identify any design aspects of the shovel that hindered control.

Shovel 1 The small bucket part + long handle
Shovel 2 the slippery handle
Shovel 3 slippery handle + slits in bucket

4. Recommend enhancements for better control.

Shovel 1 shorter handle + bigger bucket part
Shovel 2 more textured handle



Shovel 3 more textured handle & no holes/slits in bucket

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the Borg RPE scale (6-20), rate your perceived exertion.

(Rating Rating Shovel 1 11 Shovel 2 12 Shovel 3 11).

PF 1 steel
PFG black
PFN plastic blue

2. Pitchfork

Worksheet 1: Comfort and Cardiovascular Effort Assessment for Pitchfork Use

Pitchfork Type (A, B, C, D, E, F, G, H, I, J, K, L, M.....):

Task Description: Removing straw mixed with dung and transferring them to a wheelbarrow.

Comfort Evaluation for Pitchfork:

6. On a scale from 1 to 5, rate the overall comfort of using the pitchfork (1 being extremely comfortable, 2 comfortable, 3 moderately comfortable, 4 uncomfortable, 5 being extremely uncomfortable).

1. (Rating Pitchfork 1 4 Pitchfork 2 2 Pitchfork 3 3).

2. Describe any specific discomfort points while using shovels. (e.g. hands, wrists, arms, or body) Please describe.

Pitchfork 1 wrists, forearms, back

Pitchfork 2 back

Pitchfork 3 Right arm + back

3. Identify features of the shovel that contributed to or alleviated discomfort. (e.g., grip design, curvature)

Pitchfork 1 handle was very bulky and heavy
~~grip~~ gripless

Pitchfork 2 design

Pitchfork 3 the handle was very long + the grip was uncomfortable

4. Suggest improvements for the shovel's comfort.

Pitchfork 1 lighter weight material used to make it

Pitchfork 2 the grip part of handle was very low on the handle

Pitchfork 3 shorter handle + smoother grip

Worksheet 2: Control and Perceived Exertion Assessment for Pitchfork Use

Control Evaluation:

7. On a scale from 1 to 5, rate your perceived level of control while using the (1 being extremely in control, 2 in control, 3 moderately in control, 4 slightly in control, 5 Not in control at all).

1 (Rating Pitchfork 1 3 Pitchfork 2 2 Pitchfork 3 2).

- 2 Discuss the shovel's ability to maintain control over the load.

Pitchfork 1 the fork was heavy and difficult to maneuver

Pitchfork 2 the plastic ~~fork~~ teeth made it difficult to

Pitchfork 3 the deeper bucket made it easy to hold a lot

- 3 Identify any design aspects of the shovel that hindered control.

Pitchfork 1 the heaviness

Pitchfork 2 the plastic teeth

Pitchfork 3 handle

- 4 Recommend enhancements for better control.

Pitchfork 1 lighter weight

Pitchfork 2 heavier duty teeth

Pitchfork 3 shorter handle

Cardiovascular Effort Evaluation:

5. Estimate your heart rate during the task and compare it to your target heart rate zone.

Using the [Borg RPE scale \(6-20\)](#), rate your perceived exertion for pitchforks.

(Rating Pitchfork 1 13 Pitchfork 2 11 Pitchfork 3 11).

General Instructions:

Participants should complete these assessments after using each tool type for the designated tasks. Feedback should be detailed, focusing on ergonomic efficiency, cardiovascular effort, and perceived exertion to guide recommendations for design improvements. This approach ensures that the assessment captures not only